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PHYSICS ABSTRACTS

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ABSTRACTS 514–766
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511.53 514

A diophantine equation with seven solutions. BILLING, G. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 14, [7 *pp.*], 1941.—An example is given of an exceptional cubic with 7 rational points. A. HU.

511.53 515

A diophantine equation with nine solutions. BILLING, G. *Ark. Mat. Astr. Fys.*, 27*B*, 3, *No.* 8, [5 *pp.*], 1941.—An example is given of an exceptional cubic with 9 rational points. A. HU.

511.92 516

Formulation of the product of demlo-numbers. CHANDRATRAYA, M. L., AND KAPREKAR, D. R. *J. Univ. Bombay*, 12, *pp.* 14–18, *Nov.*, 1943.—[See Abstr. 1829 (1943)].

512.831 : 621.392.51 : 621.396.611.33 = 3 517

Applications of matrix algebra in problems of h.f. engineering. PÄSLER, M. *Hochfrequenztechn. u. Elektroakust.*, 59, *pp.* 78–85, *March*, 1942.—[Abstr. 589 B (1944)].

513.01 = 4 518

Summary of an outline of the principles of geometry. PETRINI, H. *Ark. Mat. Astr. Fys.*, 27*A*, 2, *No.* 10, [17 *pp.*], 1940.

518.3 : 621.396.615 519

Phase-shift oscillator design charts. KUNDE, W. W. *Electronics*, 16, *pp.* 132–133, *Nov.*, 1943.

518.5 : 536.423.15 520

Vapour-pressure slide rule. MILES, F. T. *Industr. Engng Chem.*, 35, *pp.* 1052–1061, *Oct.*, 1943.—A slide rule is described which rapidly performs v.p. calculations for all pure liquids with normal b.p. in range − 38°–400°C. The slide rule has 2 independently adjustable slides corresponding to b.p. and entropy of vaporization. Any liquid is represented by a particular setting of the two slides; when this has been made, the entire v.p. curve can be read from adjacent pressure and temperature scales; the critical point and molal heat of vaporization at the b.p. are shown. Index points mark the settings for 87 known liquids. Settings for 7 classes of liquids are shown by lines. Additional scales perform gas-law calculations and conversions of temperature, pressure and heat values to different units.

518.5 : 621.3 521

Mechanical integration in electrical problems. HARTREE, D. R. *J. Instn Elect. Engrs*, 90, *Part I*, *pp.* 435–442, *Oct.*, 1943. *Kelvin Lecture*.—[Abstr. 477 B (1944)].

519.281.2 : 550.35 *see Abstr.* 729

521.2 522

The historical development of celestial co-ordinate systems. WOOLARD, E. W. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 77–90, *April*, 1942.—The origin of the various co-ordinate systems in astronomical use is discussed, and the functions of the horizon, the equator and the ecliptic as fundamental reference planes are contrasted. The history of the terms "Right Ascension" and "Declination" is traced back to the ancient Greeks. A. HU.

521.4 : 523.48 : 523.64 523

An attempt to determine the mass of Pluto from its disturbing effect on Halley's Comet. RICHARDSON, R. S. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 19–23, *Feb.*, 1942.—The delay of 3 days in perihelion passage of Halley's Comet in 1910 cannot be accounted for by the perturbing effect of Pluto if its mass is $\simeq$ that of the Earth. The effect on the next return, though much stronger, is not likely to be more than a fraction of a day. A hypothetical planet of the Earth's mass moving in the plane of the comet would have to approach it within a few tenths of an astronomical unit to produce a 3-day delay. A. HU.

522.61 : 621.317.39 : 771.36 524

Determining the speed of a camera shutter by a thermo-electric method. PETTIT, E. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 37–41, *Feb.*, 1942.—An arrangement is described in which light from a const. source passes through the shutter whilst it is open on to a 4-junction vacuum thermopile connected to a galvanometer used ballistically. Calibration is performed by means of a rotating sector. Results are tabulated for 4 shutters with settings up to 1 sec., and the effects, important in astronomical work, of orientation and of low temp. are investigated. A. HU.

522.612 : 535.511 525

The use of the interference polarizing monochromator. PETTIT, E. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 41–43, *Feb.*, 1942.—This device for viewing the solar chromosphere, prominences and bright eruptions directly, in nearly monochromatic light, is modified for photographic observations. A pyroxylin pellicle 10 μ thick inclined at 45° to the optical axis reflects about 8% of the incident light for guiding whilst photographing. Prominences appear 30 times brighter than in a spectrohelioscope, and bright eruptions can be photographed on a large scale with exposures of a few thousandths of a sec. A. HU.

522.614 : 523.874 526

The relative accuracy of radial velocities measured with the spectrocomparator and with the usual measuring machine. HANSEN, J. M. V. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 203–205, *Oct.*, 1942.—Radial-velocity measures of 23 good spectrograms of a star are made with a Hartmann spectrocomparator and by individual line measurement. The probable errors of the radial velocities found are not significantly different, though a systematic difference was noticed betw. the values. The method of line measurement, though more laborious, is preferred because of the difficulty of avoiding unconscious bias from previous measures in the spectrocomparator. A. HU.

523.48 : 523.64 : 521.4 *see Abstr.* 523

523.64 : 523.48 : 521.4 *see Abstr.* 523

523.67 527

Spectra of comets. SWINGS, P. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 123–136, *June–Aug.*, 1942.—The excitation of molecular spectra in comets is attributed to fluorescence excited by solar radiation in neutral molecules formed by photodissociation of occluded gases in the meteoritic particles constituting the

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nucleus. Anomalous intensity distributions in the rotational lines of CN are due to the effect of Fraunhofer absorption lines in the exciting radiation. The existence of isotopic bands is discussed, and explanations are suggested for the observed molecular distribution and abundance in various parts of comets. Possible ionization mechanisms are reviewed, and suggestions are made for the direction which future work should take. A. HU.

523.746 528

Sunspot activity during 1941. NICHOLSON, S. B., AND MULDERS, E. S. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 8–10, *Feb.*, 1942. A. HU.

523.746 529

Summary of Mount Wilson magnetic observations of sunspots for November and December, 1941. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 43–45, *Feb.*, 1942. A. HU.

523.752 530

Tentative theory of solar prominences. ALFVÉN, H. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 20, [10 *pp.*], 1941.—Assuming that the magnetic field of a sunspot can be represented by a vertical dipole below the surface, and that vortical motion occurs round the axis of the spot, an electric polarization is shown to occur, leading to motion of atmospheric electrons and ions along the lines of force. The discharge will favour lines along which the electric field strength is a max., and these are shown to resemble some observed prominence forms. A. HU.

523.77 : 535.332 *see Abstr.* 593

523.813 : 523.842.3 531

Spectroscopic binaries and their parallaxes. HANSEN, J. M. V. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 137–144, *June–Aug.*, 1942. *Addendum*, *pp.* 202–203, *Oct.*, 1942.—The possibility of detecting orbital motion from parallax residuals is reviewed, and the converse question of the accuracy of trigonometric parallaxes derived for spectroscopic binaries is raised. A list of such binaries with orbits comparable in size to that of the Earth is given, and it is suggested that the parallax of any star in the list should be carefully scrutinized before being accepted. A. HU.

523.832 : 523.874 532

The proper-motion star Ross 766. WILSON, R. E., AND HUMASON, M. L. *Publ. Astr. Soc. Pacif.*, 54, *p.* 156, *June–Aug.*, 1942.—The star has a proper motion of 0″·596 in position angle 200° and a radial velocity of + 42 km./sec. The spectral type is M3 and the spectroscopic parallax 0″·032. A. HU.

523.841.11 533

Further data bearing on the identification of the Crab Nebula with the supernova of 1054 A.D. DUYVENDAK, J. J. L., MAYALL, N. U., AND OORT, J. H. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 91–104, *April*, 1942.—New translations of ancient Oriental chronicles based on observations at K'ai-feng and Peking, China, and at Kyoto, Japan, date the appearance of a "guest-star" as the end of June or beginning of July, 1054, and establish that it was visible in daylight at max., and was followed for nearly 2 years. The star is practically identical in position with what is now the Crab Nebula, for which the present expansion velocity indicates a time of origin about 1100 A.D. Both objects, considered independently, show a supernova character, and it is deduced that the nebula is in fact the remains of a bright supernova which appeared in 1054. A. HU.

523.841.12 534

The "nova-like" variable UZ Tauri. JOY, A. H. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 33–35, *Feb.*, 1942.—Mt. Wilson photographs show a faint red double in the position of this irregular variable. The components are of visual mag. 13·0 and 13·3, separation 3″·5, both spectra being early *d*Me with strong emission lines of H and Ca II. The observations indicate a previously unrecognized type of variation in red dwarfs. A. HU.

523.841.2 : 523.873 535

Spectral criteria in the classification of variable stars. JOY, A. H. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 15–18, *Feb.*, 1942.—The author examines the problem of identifying the type of variation in a variable star from a single spectrogram or a few scattered ones. Spectroscopic criteria are developed which are suitable for identifying intrinsic variables and predicting the approx. period and range of light variation. The method is more precise and much quicker than the photometric one. A. HU.

523.841.3 : 523.872 536

The spectrum of VX Cassiopeiae. VYSSOTSKY, A. N. *Publ. Astr. Soc. Pacif.*, 54, *p.* 160, *June–Aug.*, 1942.—The star is one of the very rare white irregular variables apparently not associated with nebulosity. A. HU.

523.841.9 537

Observations of RW Tauri at minimum light. JOY, A. H. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 35–37, *Feb.*, 1942.—Spectrograms taken wholly within min. of this eclipsing binary show double emission components of the H lines superposed on the K0 subgiant spectrum of the secondary. Further plates taken near 2nd and 3rd contact show that the emission originates in a rotating gaseous ring surrounding the primary B9 star equatorially, its dia. being < that of the K0 star. A. HU.

523.842 538

The spectroscopic binaries Σ 1669A and Σ 1669B. SANFORD, R. F., AND KARR, E. *Publ. Astr. Soc. Pacif.*, 54, *p.* 154, *June–Aug.*, 1942.—The components of this visual double star are themselves spectroscopic binaries, whose orbits are derived from Mt. Wilson plates. The period of A is 44 days as compared with 1·5 days for B. The velocities of the systems are nearly equal, and it may be assumed that they form a physically related pair. A. HU.

523.842.3 : 523.813 *see Abstr.* 531

523.842.3 : 523.872 539

Line intensities of μ^1 Scorpii. STRUVE, O., AND ELVEY, C. T. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 151–152, *June–Aug.*, 1942.—McDonald spectrograms taken in 1939 show no variation in the relative intensities of the absorption lines from the 2 components of this spectroscopic binary. Earlier Harvard plates show undoubted changes amounting to a factor of 2 and correlated with the orbital motion. It is concluded that the amplitude of the intensity variation shows a secular change. A. HU.

523.851.4 540

A faint member of the Hyades group. MAANEN, A. VAN. *Publ. Astr. Soc. Pacif.*, 54, *p.* 109, *April*, 1942. A. HU.

523.852.21 541

Note on the distribution of light through the Trifid Nebula (Messier 20). WALLENQUIST, A. *Ark. Mat. Astr. Fys.*, 27*B*, 3, *No.* 7, [3 *pp.*], 1941.—Counts of silver grains in 252 selected areas of a photograph of this nebula are used to draw isophotal contours. A. HU.

523.852.22 542

Two small planetary nebulae. MERRILL, P. W. *Publ. Astr. Soc. Pacif.*, 54, *p.* 107, *April*, 1942. A. HU.

523.852.22 543

Four new planetary nebulae. VYSSOTSKY, A. N. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 152–153, *June–Aug.*, 1942. A. HU.

523.852.22 544

The nucleus of the planetary nebula NGC 1514. MCLAUGHLIN, D. B. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 31–33, *Feb.*, 1942.—The star BD + 30°623 is the nucleus of this planetary nebula. New spectrograms show that its previous classification as O8 is incorrect: it is B9. The star is thus of the latest spectral class known for a planetary nucleus, and observations of the spectrum of the nebulosity are needed. A. HU.

523.852.24 545

The origin of cometary nebulae. MINKOWSKI, R. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 190–194, *Oct.*, 1942.—It is suggested that cometary nebulae are formed by radiation pressure from a star expelling a fan of dust from a small cloud of interstellar matter in which the star happens to be immersed. A cone of particles is shown to be ejected from the boundary of the cloud (assumed plane), the angular aperture depending on the optical thickness of the cloud normal to the boundary and on the ratio of radiation pressure to gravity for the unobscured star. Rough quantitative agreement with this mechanism is found in NGC 2261 (excited by R Mono) and NGC 6729 (excited by R CorA). A. HU.

523.852.3 546

Clusters of nebulae. ZWICKY, F. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 185–189, *Oct.*, 1942.—Counts of nebulae in the clusters in Coma, Perseus and Hydra are used to plot a common distribution curve exhibiting the concentration of nebulae towards the centre of the cluster. The distribution agrees with that in the Emden bounded isothermal gas sphere, and it is deduced that the clusters are stationary assemblies and that Newton's law of gravitation is sufficient to represent the interaction of nebulae separated by distances of the order of 10^6 light years. The bearing of these results on the theory of the expanding universe is indicated. A. HU.

523.852.32 547

Polarigraphic observations of an obscuring cloud close to the nucleus of the Andromeda Nebula M 31. ÖHMAN, Y. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 72–76, *April*, 1942.—A new polarigraph employing a Wollaston prism in place of the Iceland spar previously used [Abstr. 3567 (1939)] shows faint effects of positive polarization in a cloud 15″ from the nucleus of this spiral. The observations support Lindblad's view of the sense of the rotation [Abstr. 2595 (1940)]. A. HU.

523.854.12 548

Some remarks concerning the dark cloud in Auriga. SCHALÉN, C. *Ark. Mat. Astr. Fys.*, 27*A*, 2, *No.* 11, [10 *pp.*], 1940.—Two methods for deriving the distance, absorption and radial extension of a dark cloud are compared. Malmquist's trial-and-error method is difficult to apply when there is a large dispersion in abs. mag., and involves the application of statistics to small groups of stars. The Wolf-diagram method can be applied to stars grouped closely by spectral type, and as developed by the author avoids the dispersion difficulty by using density curves computed with due regard to intrinsic differences of abs. mag. in any one spectral type. The Wolf method is recommended for dealing with scanty material. A. HU.

523.872 549

Evidence of chlorine in U Cygni. SANFORD, R. F. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 158–159, *June–Aug.*, 1942.—On the basis of King's furnace spectra [Abstr. 593 (1944)] 2 band heads in the red region of the spectrum of this star at min. light are ascribed to CaCl. Other variables which are very cool show the bands at all phases. This is the first evidence of Cl in stellar atmospheres. A. HU.

523.872 550

The ultra-violet spectrum of HD 190073. STRUVE, O. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 11–14, *Feb.*, 1942.—Metallic emission lines in the shell spectrum of this star stand out sharply from the depleted continuous spectrum of the exciting source below the Balmer limit. The spectrum is fairly accurately a reversal of the stronger absorption lines of α Cygni, except that the H lines are very weak in emission and there is no atomic continuum, absorption or emission, below the Balmer head. It is suggested that this weakening of the H excitation is due to depletion of the exciting radiation beyond the Lyman limit. A. HU.

523.872 : 523.841.3 *see Abstr.* 536

523.872 : 523.842.3 *see Abstr.* 539

523.873 551

A peculiar B-type spectrum. POPPER, D. M. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 160–161, *June–Aug.*, 1942.—Spectrograms of HD 124448 show no trace of H lines, emission or absorption, or of continuous absorption at the Balmer limit, though the He lines are strong. It is suggested that the abundance of H is very low in this star. A. HU.

523.873 : 523.841.2 *see Abstr.* 535

523.874 : 522.614 *see Abstr.* 526

523.874 : 523.832 *see Abstr.* 532

523.875 552

Composite spectra and subdwarf stars. PETRIE, R. M. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 195–198, *Oct.*, 1942.—From a study of 500 stellar systems showing composite spectra due to separate stars, 18 are selected in which the primary is a main-sequence star exhibiting a solar-type spectrum and the secondary is an early A-type star about a magnitude fainter. These latter

components are subdwarfs resembling the "intermediate" white dwarfs, and are about 1/5 the radius and 100 times the density of main-sequence stars of the same spectral type. A. HU.

523.899 553

Additional stars of classes N and S. MERRILL, P. W., SANFORD, R. F., AND BURWELL, C. G. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 107–109, *April*, 1942.—Positions and spectral classifications are given for 33 late-type stars. A. HU.

523.899 554

Seven new S-type stars. VYSSOTSKY, A. N. *Publ. Astr. Soc. Pacif.*, 54, *p.* 153, *June–Aug.*, 1942. A. HU.

523.899 555

Five bright-line stars of class F. MERRILL, P. W. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 155–156, *June–Aug.*, 1942. A. HU.

525.23 : 621.396.812.5 = 3 556

Radio interference noise as astronomical research instrument. HARDUNG, V. *Bull. Ass. Suisse Élect.*, 34, *pp.* 348–350, *June* 16, *and pp.* 371–374, *June* 30, 1943.—[Abstr. 207 B (1944)].

525.75 : 551.594.51 *see Abstr.* 753

53 : 615.84 557

Some aspects of the teaching of radiological physics. QUIMBY, E. H. *Radiology*, 41, *pp.* 315–329, *Oct.*, 1943.—Examinations conducted by The American Board of Radiology have shown difficulties of comprehension of certain aspects of X-ray and radium dosage. The phenomena of scattering filtration and dosage are dealt with in detail. B. J. L.

53.047 : 582.271.2 : 581.037 *see Abstr.* 758

53.087.6 558

The electrochemist adopts automatic recording devices used in medical research. GORRELL, J. *Trans. Electrochem. Soc.*, 83, *Prepr. No.* 22, 1943.—Two recording devices are described: the monodrum and the dualdrum. A stylus attached to a lever and activated by changes in liquid level or in pressure automatically records these changes on a moving belt of paper. The speed of the moving belt can be varied within wide limits. E. R. A.

530.1 559

On existence and complementarity in physics. HUTTEN, E. H. *Amer. J. Phys.*, 11, *pp.* 328–334, *Dec.*, 1943.—A discussion of interpretation of classical and quantum-mechanical theories with ref. to reality of perceptions.

530.12 560

Note on the mass-particle in an expanding universe. JÄRNEFELT, G. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 15, [10 *pp.*], 1941.—McVittie's generalization [Abstr. 2819 (1933)] of the Schwarzschild metric is used to investigate the motion of an immaterial particle in a specialized non-physical universe of infinite radius of curvature. An exact orbital equation is derived consisting of terms accounting for the Newtonian central motion and the secular perturbation of perihelion, and a cosmical term. The nature of the radial and the non-radial motion is investigated and the results correlated with observation. A. HU.

530.145.5 : 537.531 : 535.33 561

Determination of *h/e* from the short-wavelength limit of the continuous X-ray spectrum. OHLIN, P. *Ark. Mat. Astr. Fys.*, 27*B*, 3, *No.* 10, [4 *pp.*], 1941.—Seventeen determinations of *h/e* are made by the method of isochromats at 4 wavelengths. The value of *h* thus found agrees with that determined by other methods only if the pressure in the X-ray tube is lower than 10^{-5} mm. At higher working pressures discrepancies of up to 0·2% occur owing to a displacement of the threshold voltage. A. HU.

530.145.6 : 537.533 = 3 *see Abstr.* 636

530.145.6 : 539.152 = 3 *see Abstr.* 655

531.226 : 624.27 562

Theoretical and experimental investigations of thin-webbed plate-girder beams. LANGHAAR, H. L. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 799–802, *Oct.*, 1943.—A theory for the design of webs and flange rivets of thin-webbed rectangular plate-girder shear beams is presented. Calculations of shear loads to cause web rupture and flange rivet failure are compared with test data from 27 beams.

531.258 563

The influence of the shape and rigidity of an elastic inclusion on the transverse flexure of thin plates. GOLAND, M. *J. Appl. Mech.*, 10, *A69–A75*, *Sept.*, 1943.—An inclusion is defined as a close-fitting plate of some second material cemented into a hole cut in the interior of the elastic plate. Depending upon the properties of the material of which it is composed, the inclusion is described as rigid or elastic. The solutions deal with the effects of circular inclusions of differing deg. of elasticity and rigid inclusions of varying elliptical form.

531.259.2 564

Stresses and displacements in a rotating conical shell. MERIAM, J. L. *J. Appl. Mech.*, 10, *A53–A61*, *Sept.*, 1943.—The paper extends the theory of axially symmetrical shells by including the body force of rotation about the axis and applies the results to the rotating conical shell. The analysis follows an established pattern and is abbreviated to a considerable extent.

531.259.2 : 539.214 565

A principle of maximum plastic resistance. SADOWSKY, M. A. *J. Appl. Mech.*, 10, *A65–A68*, *Sept.*, 1943.—The principle of max. plastic resistance establishes a new method of computation of stresses only, without ref. to deformation. The principle treats the plastic body as a reacting medium automatically producing max. values of resultant reaction. Combined plastic tension, torsion, and inner pressure (in a boiler) are chosen as cases in which to apply the principle.

531.391 : 621.8 566

New five-bar and six-bar linkages in three dimensions. GOLDBERG, M. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 649–661, *Aug.*, 1943.—[Abstr. 631 B (1944)].

531.537 = 3 567

Time fluctuations of a pendulum clock. SCHILT, H. *Helv. Phys. Acta*, 16, 3, *pp.* 206–207, 1943.—A brief notice to foreshadow a full paper in the *Journal Suisse d'Horlogerie et de Bijouterie*. It is known that the period of a free pendulum increases with amplitude.

In a pendulum clock with Graham escapement, the impulses imparted by the escapement produce an increase of the period; but this effect is smaller, the larger the amplitude. Hence there must be an amplitude for which the period is insensitive to amplitude fluctuations. For a given escapement, this amplitude, and thereby the most satisfactory driving torque of a pendulum clock, can be determined. A. E. T.

531.717.1 : 621.317.39 568

Measurement of thickness. *Mech. World*, 113, *pp.* 592–593, *May* 28, 1943.—[Abstr. 529 B (1944)].

531.717.7 : 535.415 569

The interference spherometer. SPEYER, E. *Rev. Sci. Instrum.*, 14, *pp.* 336–338, *Nov.*, 1943.—The substitution of Newton rings for mechanical contact permits locating the setting reliably within $\pm$ 0·0002 mm. and elimination of errors due to weight of lens since the optical setting can be achieved before mechanical contact. Guild's original instrument and a new model are described.

531.718 : 621.317.39 570

An electrical tube gauge. FAWSSETT, E. *Engineering*, 156, *pp.* 301–302, *Oct.* 15, 1943.—[Abstr. 530 B (1944)].

531.77 : 778.5 : 621.317.39 571

An inexpensive stroboscope for high-speed photography. SILVERMAN, S., AND WARHUS, W. H. *Rev. Sci. Instrum.*, 14, *pp.* 273–275, *Sept.*, 1943.—[Abstr. 531 B (1944)].

531.775 : 629.135.2 : 621.317.49 572

The magnetic-drag tachometer. BALLARD, R. G. *Trans. Amer. Inst. Elect. Engrs*, 61, *pp.* 366–368, *June*, 1942. *Suppl.*—[Abstr. 538 B (1944)].

531.78 : 621.317.39 573

Measurement of dynamic strain. DOHRENWEND, C. O., AND MEHAFFEY, W. R. *J. Appl. Mech.*, 10, *A*85–*A*92, *Sept.*, 1943.—[Abstr. 532 B (1944)].

532.13 : 541.182.5 = 3 574

Rheometry and colloidal properties of the system sodium-cellulose-glycolate–water. HÖPPLER, F. *Kolloid Z.*, 98, *pp.* 348–358, *March*, 1942.—Flow curves and quasi-viscosity of aq. solutions and gels of sodium cellulose glycolate of various concentrations were investigated with a new rheoviscometer. The mechanical destruction of gels by pressing the substance through openings of capillary size, so-called rheodestruction, is described; the process is irreversible and different from thixotropy. Film formation, the reactions connected with etherizing and the swelling mechanism, are discussed and illustrated by microphotographs. R. N.

532.133 : 541.24 = 3 *see Abstr.* 707

532.133 : 541.68 575

Viscosity of *n*-paraffin solutions. KEMP, A. R., AND PETERS, H. *Industr. Engng Chem.*, 35, *pp.* 1108–1112, *Oct.*, 1943.—Viscosity measurements of equal-base molar solutions of the *n*-paraffins in *n*-hexane agree with the Staudinger relation. A comprehensive analysis of viscosity/mol.-wt. data on linear polymers has led to the development of a new viscosity const. $K_{ca} = \log \eta_r W/\Phi N$, based on the contribution to viscosity of a chain atom. The range for K_{ca} is 0·030–0·038, with average 0·032. By the use of this average K_{ca} value in the equation, the polymer length can be calculated even in the case of a non-linear type.

532.61 : 532.739.2 : 537.226.1 : 539.133 = 3 *see Abstr.* 654

532.69 : 541.123.4 576

Aminoacridines: some partition and surface phenomena. ALBERT, A., GOLDACRE, R., AND HEYMANN, E. *J. Chem. Soc.*, *pp.* 651–654, *Dec.*, 1943.—To obtain data for correlation of physical and biological properies among cationic antiseptics, the oil/water partition coefficients and the air/water surface activities of a number of aminoacridines were measured. Correlations betw. these physical properties and the mol. structure are discussed. Marked oleophilic and surface-active properties are unnecessary for, and if present in high degree are inimical to, the development of good antiseptic properties in this series.

532.72 : 539.217.3 : 632.94 577

The effect of waxes and inorganic powders on the transpiration of water through celluloid membranes. ALEXANDER, P., KITCHENER, J. A., AND BRISCOE, H. V. A. *Trans. Faraday Soc.*, 40, *pp.* 10–19, *Jan.*, 1944.—An apparatus was devised to measure accurately the rate of diffusion of water through relatively impermeable membranes into air. The rate is independent of small hydrostatic pressures. The rate of evaporation from celluloid is reduced when thin films of fatty substances are applied to the celluloid. Natural waxes are particularly active. Finely divided, inert inorganic powders (carborundum) have no effect on the evaporation from a clean celluloid film, but increase that from one coated with a water-resistant fat film. The system studied was intended to simulate the process by which inert dust insecticides operate.

532.739.2 : 532.61 : 537.226.1 : 539.133 = 3 *see Abstr.* 654

532.77 578

Vapour-pressure lowering of sulphur dioxide solutions of potassium thiocyanate from 15° to 25°C. EVERSOLE, W. G., AND WAGNER, G. H. *Proc. Iowa Acad. Sci.*, 48, *p.* 275, 1941.—The v.p. lowering was measured by a differential mercury manometer connected to an all-glass apparatus which employed no stopcocks. Readings were made to 0·001 cm. with a cathetometer. All conc. were corrected for the amount of SO_2 in the vapour phase. The molal lowering was approx. 1/2 the theoretical value at 0·005 molal and decreased with increasing conc. up to 1 molal.

533.15 = 3 579

Gas shapes. LIESEGANG, R. E. *Kolloid Z.*, 100, *pp.* 65–66, *July*, 1942.—A brief report on an observation made with tightly packed photographic paper. By an effect similar to the Russel effect but not yet sufficiently explained a nearly beamlike extension of air through several layers of thick paper was caused. R. N.

533.275 : 621.318.572 580

A bridge-controlled relay circuit. ANDREWS, H. L. *Rev. Sci. Instrum.*, 14, *p.* 276, *Sept.*, 1943.—[Abstr. 545 B (1944)].

533.56 581

Some measurements of ultimate vacuum and pump speed of molecular pumps. EKLUND, S. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 21, [9 *pp.*], 1941.—Measure-

ments of highest attainable vacuum and pumping speed at different fore pressures are made on a number of disc-type molecular pumps [Abstr. 483 (1941)] in which the dimensions of the grooves are changed systematically. Increasing the width and depth of the groove and decreasing its length improves performance and ease of construction but makes extra demands on the fore vacuum. A. HU.

534 : 548.0 = 3 *see Abstr.* 716

534 : 621.317.2 582

Acoustic laboratory in the new RCA laboratories. OLSON, H. F. *J. Acoust. Soc. Amer.*, 15, *pp.* 96–102, *Oct.*, 1943.—The laboratories include a free-field sound room, a large sound stage, a std. living room, a sound-proof room for life tests, dust-free rooms, magnetic laboratory, a live room, a field laboratory and towers, and conventional communication type laboratories.

534.131 = 4 583

Asymptotic properties of functions and characteristic values in certain vibration problems. PLEIJEL, A. *Ark. Mat. Astr. Fys.*, 27*A*, 2, *No.* 13, [100 *pp.*], 1940.—The author treats certain problems of vibrations in 3-dimensional membranes by means of Tauberian theorems, and generalizes the method by employing the calculus of variations. The treatment is extended by analogy to problems of isothermal electromagnetic vibrations in a reflecting enclosure, to 3-dimensional vibrations in elasticity theory, and to vibrations in an encastré plate. A. HU.

534.25 : 541.182.6 = 3 *see Abstr.* 704

534.372 : 621-752 584

Effectiveness of shear-stressed rubber compounds in isolating machinery vibration. MADDEN, B. C., JR. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 617–624, *Aug.*, 1943.—[Abstr. 471 B (1944)].

534.755.1 585

On subjective tones. TRIMMER, J. D. *J. Acoust. Soc. Amer.*, 15, *p.* 136, *Oct.*, 1943.—[See Abstr. 624 (1943)].

535.23.08 586

Absolute measurements of radiometric action in gases. II. FREDLUND, E. *Ark. Mat. Astr. Fys.*, 27*A*, 2, *No.* 12, [15 *pp.*], 1940.—An electromagnetically compensated radiometer [Abstr. 90 (1939)] is used to make radiometric measurements in He, H_2, D_2, O_2, A and N_2. At l.p. P, the radiometric effect R is $\propto P$; at h.p. $R \propto P^{-2}$. Radiometric curves connecting log R with log P in the various gases can be made to coincide over almost their whole pressure range by suitable relative displacements. By a suitable transformation, curves obtained on a similar radiometer with a different plate separation can also be fitted to a general reduced radiometric curve. A. HU.

535.234 : 536.7 = 3 587

A thermodynamic way to the Planck radiation law. LOHR, E. *Z. Phys.*, 116, 7–8, *pp.* 454–468, 1940.—The earlier starting point [Abstr. 648 (1937)] is explained, and it is shown that the co-existence of a radiation gas with the radiation under investigation leads to the Rayleigh–Jeans radiation law. The new assumption substitutes a gas mixture for the radiation gas. The properties of the second gas are determined. H. G. S.

535.317 = 3 588

Study of the dynamic lens. MEIER, F. J. *Helv. Phys. Acta*, 16, 3, *pp.* 277–322, 1943.—Investigates the practicability of the lens [see Abstr. 2580 (1942)]. A detailed analysis of the mechanical and optical conditions appertaining to the system is given, and extensive experimental investigations are described, 3 shell materials being examined, viz. Plexiglas, Melopas and Cellon. A. E. T.

535.317.6 589

A note on ray-tracing by machine. ELLIS, J. H. *J. Opt. Soc. Amer.*, 33, *pp.* 665–666, *Dec.*, 1943.—[See Abstr. 1153 (1940)].

535.32-31 = 3 590

The ultra-violet dispersion frequencies of the alkali oxides. RAUSCH, W. *Z. Phys.*, 116, 9–10, *pp.* 652–656, 1940.—A method of preparing thin salt layers of the alkali oxides (Li_2O, Na_2O, K_2O, Rb_2O and Cs_2O) is described. The ultra-violet dispersion frequencies are measured. The observed and computed values are tabulated for comparison. The position of the first absorption max. is given by an empirical formula: $h\nu = Q + E_1 + E_2 - 2J$. H. G. S.

535.33 : 537.531 : 530.145.5 *see Abstr.* 561

535.33 : 614.715 591

Sampling, mixing, and grinding techniques in the preparation of samples for quantitative analysis by X-ray diffraction and spectrographic methods. BALLARD, J. W., OSHRY, H. I., AND SCHRENK, H. H. *J. Opt. Soc. Amer.*, 33, *pp.* 667–675, *Dec.*, 1943.—The report describes methods for obtaining small, representative samples of atmospheric particulate matter and for mixing such samples intimately with an internal std. in a ball mill or a motor-driven mortar and pestle. The diamond mortar, ore grinder and riffle, are used in obtaining a representative sample.

535.33.03 : 669.3 : 621.325.5 592

The spectrographic analysis of copper and copper-rich alloys by the arc method. MILBOURN, M. *J. Inst. Met.*, 69, *pp.* 441–463, *Oct.*, 1943.—[Abstr. 550 B (1944)].

535.332 : 523.77 593

Note concerning lines of neutral dysprosium. KING, A. S. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 201–202, *Oct.*, 1942.—Several lines in the solar spectrum hitherto attributed to Dy II are shown from furnace spectrograms to be the ultimate lines of Dy I. A. HU.

535.333 : 546.41 594

Calcium oxide and chloride bands in the electric furnace. KING, A. S. *Publ. Astr. Soc. Pacif.*, 54, *pp.* 157–158, *June–Aug.*, 1942.—Furnace spectra of metallic Ca in an O_2 atmosphere show a system of 14 bands in the orange region which is attributed to CaO. Another system previously attributed to Ca_2 because it appeared in the vacuum furnace is now ascribed to the chloride since the metal is prepared by electrolyzing the chloride. A. HU.

535.338 : 537.531 *see Abstr.* 634

535.338.332 : 539.152.2 = 3 595

Interferometer investigations with condensed hollow-cathode discharges. WITTKE, H. *Z. Phys.*, 116, 9–10, *pp.* 547–561, 1940.—A method is described by which highly ionized spectra with strong light intensity and

narrow line widths are obtained which enable interferometer measurements of their lines to be made. Examples of spectra of doubly-ionized Sc, Y, La and Bi and of quadruply-ionized Pr are given and discussed. The hyperfine structures of the first four are investigated and from them the magnetic nuclear moments of these elements are determined. H. G. S.

535.338.4 596

The $^2\Sigma^- \rightarrow {}^2\Pi$ and $^2\Delta \rightarrow {}^2\Pi$ systems of the band spectra of CH and CD. FAGERHOLM, E. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 19, [18 *pp.*], 1941.—A complete remeasurement of the bands in these systems on new high-dispersion spectrograms is used to derive the term values and rotational constants of the states concerned. A. HU.

535.338.42 597

Rotational analysis of the emission spectrum of CuF. WOODS, L. H. *Phys. Rev.*, 64, *pp.* 259–264, *Nov.* 1 *and* 15, 1943.—The emission spectrum of gaseous HF at 0·1 mm. pressures in a Cu hollow cathode was examined from 7 000 to 2 000 Å and an unknown band spectrum of widely spaced lines in the region 2 450–2 600 Å, thought to be the $^2\Sigma \rightarrow {}^2\Pi$ transition of HF+ was found. From the same source the emission spectrum of CuF was obtained and photographed. The spectrum consists of 3 band systems lying at 5 700 Å, 5 060 Å and 4 920 Å. A rotational analysis of the spectrum shows the 3 systems to have the same lower state, and to be of the type $^1\Pi \rightarrow {}^1\Sigma$, $^1\Sigma \rightarrow {}^1\Sigma$, and $^1\Pi \rightarrow {}^1\Sigma$. The constants of these states are given.

535.338.42 : 546.17 = 3 598

Rotation analysis of the fourth positive bands of the N_2-molecule. GERÖ, L., AND SCHMID, R. *Z. Phys.*, 116, 9–10, *pp.* 598–603, 1940.—The results of the measurements and the classification of the lines of the bands λ2 351 Å (0–1) and λ2 448 Å (0–2) of the D–$B^3\Pi$-system of N_2 are given. The bands consist of 15 branches. The structure of the upper D-state is the same as that of a $^3\Sigma_u^+$-term which shows no measurable spin cleavage. The lines indicate intensity interchange within the branches, and for even values of the rotation I-quantum numbers the S_1, Q_1, R_2, P_2, Q_3 and O_3 lines are stronger, those of the branches T_1, R_1, P_1, S_2, Q_2, O_2, R_3, P_3 and N_3 weaker. The rotation constants in the $D^3\Sigma_u^+N_2$-state are $B_0 = 1{\cdot}961$ cm.$^{-1}$ and $D_0 = 2 \times 10^{-5}$ cm.$^{-1}$ H. G. S.

535.343 = 3 599

Quantitative photographic absorption measurements of the CH-bands of aliphatic alcohols at λ9 100 Å. ZIEGLER, R. *Z. Phys.*, 116, 11–12, *pp.* 716–728, 1940.—The absorption spectra of methyl, ethyl, *n*-propyl, isopropyl, *n*-butyl, isobutyl, isoamyl, tertiary amyl and hexyl alcohols, glycol and glycerin are determined in the range 8 500–12 000 Å. The position and the total absorption $A = \int \varepsilon dv$ of the bands of the CH-valency vibration $v = 4$ at λ9 100 Å, as well as the position of the neighbouring OH_2-bands, are given and the co-ordination of the bands discussed. H. G. S.

545.343.3-1 : 545.82 600

Analysis by infra-red spectroscopy. NIELSEN, J. R., AND SMITH, D. C. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 609–615, *Oct.* 15, 1943.—A method of analysis by infra-red spectroscopy is described, applicable if Beer's law holds and a set of wavelengths can be found such that at each wavelength only 1 component of the mixture has strong absorption while the other components have weak absorption. Application to ternary mixtures of the 4 lowest nitroparaffins is described. [See Abstr. 592 (1941)].

535.343-31 : 541.132.3 *see Abstr.* 694

535.343.32-31 601

Absorption spectra of some organic solutions in the vacuum ultra-violet. PLATT, J. R., RUSOFF, I., AND KLEVENS, H. B. *J. Chem. Phys.*, 11, *pp.* 535–544, *Dec.*, 1943.—A search for a suitable solvent for extending the absorption curves of organic compounds into the vacuum ultra-violet led to the discovery that *n*-hexane and *n*-heptane give satisfactory transmission to 1 700 Å, in 0·3 mm. cells. The transmission limits of several solvents are given; and the absorption curves in this region are plotted for a number of organic compounds, showing the double-bond peak at 1 840 Å from octene-3.

535.371 = 3 602

Fluorescence of solid substances in compact and dispersed states. KUHN, A. *Kolloid Z.*, 100, *pp.* 126–135, *July*, 1942.—The influence of the deg. of dispersity on intensity of fluorescence of materials (mainly organic) fluorescent in the solid and dissolved state, in the dissolved state only, and in the solid state only, is discussed. In some cases the substances have a different fluorescent colour in the dissolved and in the solid state. R. N.

535.376 = 3 603

On the behaviour of luminescent materials under intermittent electron irradiation. KNOLL, M. *Z. Phys.*, 116, 7–8, *pp.* 385–414, 1940.—The luminescence, charge and secondary emission are investigated. The fall in the rate of rise and decay of luminescence with increasing current density [Abstr. 1150 (1939)] is confirmed for low temperatures. The fall appears to be connected with the increase in the electron concentration in the luminescent material due to the increase of the current density. The brightness drops with the electron-ray concentration. The charge is a function of the secondary emission factor, which is dependent on the electron speed and the nature of the luminescent material. For ZnO it starts at an anode voltage of 2 kV as for the metals; for ZnS + CdS and other luminescent materials at 5 to 10 kV. H. G. S.

535.4 : 537.533.73 : 537.531 *see Abstr.* 635

535.415 604

The thickness of a rigid water layer on quartz from measurements of Newton's rings. EVERSOLE, W. G., AND LAHR, P. H. *Proc. Iowa Acad. Sci.*, 48, *p.* 275, 1941.—Newton's rings produced by a quartz plate and lens in a slit source of light were observed in a low-power travelling microscope. The (radius of the rings)^2 plotted *v.* order of the ring (n) from the centre yields a straight line whose intercept on the axis $n = 0$ is a function of the vertical separation of the lens and plate but not a function of the index of refraction of the medium between them nor the angle of incidence of the light. The ring radii were measured with air and with water between the lens

and plate. The graphs for the two cases have different intercepts, indicating a rigid water multilayer between the quartz surfaces of the order of 200 Å in thickness.

535.415 : 531.717.7 *see Abstr.* 569

535.511 : 522.612 *see Abstr.* 525

535.551 : 539.216.1 = 3 *see Abstr.* 675

535.566.2 : 547.979.3 = 3 605

On the optical rotating power of crocine in true and colloidal solutions. KUHN, R., AND LÖW, I. *Kolloid Z.*, 100, *pp.* 136–137, *July*, 1942.—A comparison is made between the optical activity of crocine, the red dyestuff of safran, when polarized with the red Cd-line, in true solutions (methanol, glacial acetic acid and pyridine), and in colloidal aq. solutions. The rotatory power in the former cases is very small, in the latter exceedingly high. R. N.

535.66 : 548.0 = 3 *see Abstr.* 717

535.755 606

A note on theoretical colour-blindness frequencies. PLATT, J. R. *J. Opt. Soc. Amer.*, 33, *p.* 679, *Dec.*, 1943.—[See Abstr. 2343 (1943)].

535.89 : 537.541 : 537.228.5 *see Abstr.* 623

536.2.022 : 662.998 607

Heat-insulating materials. GRIFFTHS, E., AND HICKMAN, M. J. *Mech. World*, 114, *pp.* 16–22, *July* 2, 1943. *Abstr. in J. Text. Inst.*, 34, *A*415, *Aug.*, 1943.—[Abstr. 672 B (1944)].

536.212.3 : 674.04 : 621.365.92 608

Heat-conduction problems in presses used for gluing of wood. BROWN, G. H. *Proc. Inst. Radio Engrs, N.Y.*, 31, *pp.* 537–548, *Oct.*, 1943.—[Abstr. 566 B (1944)].

536.24 : 621.791.052.2 : 621.3.012.8 609

Establishment of cooling curves of welds by electrical analogy. PASCHKIS, V. *Weld. J.*, *pp.* 462*s*–483*s*, *Oct.*, 1943.—[Abstr. 479 B (1944)].

536.24.01 : 621.43.016.4 610

Heat transfer to a fluid flowing periodically at low frequencies in a vertical tube. MARTINELLI, R. C., BOELTER, L. M. K., WEINBERG, E. B., AND YAKAHI, S. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 789–798, *Oct.*, 1943.—The experiments described are the beginning of a long-range programme on heat transfer in the cylinders of i.c. engines.

536.242 : 621.791.75 : 621.367 611

Measurement of cooling rates associated with arc welding. HESS, W. F., MERRILL, L. L., NIPPES, E. F., AND BUNK, A. P. *Weld. J.*, *pp.* 377*s*–422*s*, *Sept.*, 1943.—[Abstr. 571 B (1944)].

536.245 : 621.186 612

Studies of heat transmission through boiler tubing at pressures from 500 to 3 300 pounds. DAVIDSON, W. F., HARDIE, P. H., HUMPHREYS, C. G. R., MARKSON, A. A., MUMFORD, A. R., AND RAVESE, T. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 553–591, *Aug.*, 1943.—[Abstr. 475 B (1944)].

536.413 : 539.377 = 3 *see Abstr.* 682

536.421.4 613

Rate of ice formation. LONDON, A. L., AND SEBAN, R. A. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 771–778, *Oct.*, 1943.—A method for the solution of the freezing problem is presented with applications to ice formation at spherical, cylindrical and plane boundaries. The degree of approximation is investigated; the results are satisfactory for the solution of engineering problems.

536.421.4 : 666 : 539.377 = 3 *see Abstr.* 683

536.423.15 : 518.5 *see Abstr.* 520

536.581 : 621.385.38 614

A thyratron thermal relay. RITTENBERG, D., AND SUCHER, I. *Rev. Sci. Instrum.*, 14, *p.* 51, *Feb.*, 1943.

536.66 : 621.3.017.71 : 621.318.4 615

Influence of non-uniform development of heat upon the temperature distribution in electrical coils and similar heat sources of simple form. JAKOB, M. *Trans. Amer. Soc. Mech. Engrs*, 65, *pp.* 593–605, *Aug.*, 1943.—[Abstr. 543 B (1944)].

536.7 : 535.234 = 3 *see Abstr.* 587

536.7 : 541.132.3 *see Abstr.* 695

536.782 616

The Joule effect in air. BAKER, H. D. *Phys. Rev.*, 64, *pp.* 302–311, *Nov.* 1 *and* 15, 1943.—Previous methods used in determining the magnitude of the Joule effect are discussed. Requirements of apparatus and technique are analysed. The construction of and operational technique for a set of apparatus built to these requirements are described. Sample data on air are given and compared with other values in the literature. With indicated improvements, the method developed will achieve precision and reliability to within 0·1%.

537.226 : 621.315.616.96 617

The electrical properties of polyvinyl acetate. DAKIN, T. W. *Trans. Electrochem. Soc.*, 83, *Prepr. No.* 27, 1943.—[Abstr. 509 B (1944)].

537.226.1 : 532.61 : 532.739.2 : 539.133 = 3 *see Abstr.* 654

537.226.1.08 = 3 618

Determination of the permittivities of mixed substances. VIEWEG, R., AND GAST, T. *Z. techn. Phys.*, 24, 3, *pp.* 56–62, 1943.—The paper concerns materials consisting of discrete particles with inter-spaces (powders and fibrous materials) for which direct determination would give a mixed permittivity dep. on the values for the particles and the separating medium. A new method of measurement is given. E. R. A.

537.226.2 : 541.132 *see Abstr.* 693

537.226.2 : 548.33 *see Abstr.* 718

537.228.1 : 548.0 = 3 619

Observations on the elementary regions of electrical polarization in the piezo-electric crystals akin to Rochelle salt. QUERVAIN, M. DE, AND ZWICKER, B. *Helv. Phys. Acta*, 16, 3, *pp.* 216–218, 1943.—The observed hysteresis effects in the piezo-electric crystal KH_2PO_4 and KD_2PO_4 are assumed due to the existence of elementary regions of uniform electrical polarization. Evidence points to regions of macroscopic dimensions, of the order of a few mm. Such evidence is provided by optical and X-ray measurements, and from examination of hysteresis loops.

537.228.1 : 548.0 = 3 620

The piezo-electric effect of the KH_2PO_4 crystal, akin to Rochelle salt. BANTLE W., AND CAFLISCH, C.

Helv. Phys. Acta, 16, 3, *pp.* 235–250, 1943.—The piezo-electric modulus of a crystal may be determined by ballistic measurement of the charge of the crystal or by electrometer measurement of the p.d. across the crystal. The piezo-electric modulus of KH_2PO_4 was measured by the former method, from room temperature down to the Curie pt. $\theta = 123°K$. Experimental technique and results obtained are described, and general conclusions concerning the essential characteristics of piezo-electric substances of this type are deduced. A. E. T.

537.228.1 : 548.0 : 621.396.611.21 : 621.316.726 = 3 621

Artificial crystals of KH_2PO_4 as frequency stabilizers. BANTLE, W. *Helv. Phys. Acta*, 16, 3, *pp.* 207–209, 1943.—A brief account of an investigation of the properties of the piezo-electric crystal KH_2PO_4, to examine the possibility of its being used for frequency stabilization of h.f. oscillators in place of quartz crystals. Temp. coefficients of natural frequencies were measured for various crystal orientations. In certain cases, temp. coefficients at room temperatures of the same order as for quartz were obtained, suggesting that further orientations may exist for vanishing temp. coeff. A. E. T.

537.228.3 : 548.0 = 3 622

Electro-optical behaviour of KH_2PO_4 and KD_2PO_4 crystals. ZWICKER, B., AND SCHERRER, P. *Helv. Phys. Acta*, 16, 3, *pp.* 214–216, 1943.—Spontaneous polarization at the upper Curie pt. in KH_2PO_4 is associated with change in the double refraction. The same condition appertained with KD_2PO_4. Results of precise measurements carried out on the latter are reported. The electro-optical double refraction is $\propto$ the macroscopical electrical polarization of the crystal. A. E. T.

537.228.5 : 535.89 : 537.541 623

A new light source for investigations of the Stark effect. RYDE, N. *Ark. Mat. Astr. Fys.*, 28*B*, 1, *No.* 2, [7 *pp.*], 1942.—A water-cooled discharge tube is described in which ions are drawn from a slit in the hollow cathode by a h.v. neg. electrode just behind it. The ions recombine or excite other atoms in the strong field betw. the electrodes, and the emitted light is observed along the length of the slit and at rt. angles to the field. The performance of the source is illustrated by photographs of the Stark effect in Hβ and Hγ. A. HU.

537.311.3 : 591.175.6 *see Abstr.* 760

537.311.31 : 621.315.551 624

The electrical properties of copper-manganese-aluminium alloys. COOK, M., AND ALEXANDER, W. O. *Trans. Faraday Soc.*, 39, *pp.* 260–265, *Sept.–Oct.*, 1943.—[Abstr. 503 B (1944)].

537.312 : 621.3.015.2 625

Distribution in time of spontaneous fluctuation voltage. SURDIN, M. *Phil. Mag.*, 34, *pp.* 716–722, *Oct.*, 1943.—[Abstr. 481 B (1944)].

537.312.62 = 3 626

An attempted electron-physical interpretation of the Meissner–Ochsenfeld effect. KOCH, K. M. *Z. Phys.*, 116, 9–10, *pp.* 586–597, 1940.—The transition from the normal conducting to the supraconducting state requires a temperature difference betw. the body under investigation and its environment, a heat flow from inside outwards. This heat flow, with the magnetic field constant, is shown to give an Ettingshausen–Nernst effect which, like the Corbino effect, produces a circular current. This current, with supraconduction present, changes to the screening current which nullifies the interior magnetic field. H. G. S.

537.52 = 3 627

On the ultra-violet radiation of a non-self-sustaining gas discharge. SCHWIECKER, W. *Z. Phys.*, 116, 9–10, *pp.* 562–575, 1940.—The properties of the ultra-violet radiation of a non-self-sustaining gas discharge between plane electrodes are investigated with a tube-counter arrangement, which is fully described. The results show that the main portion of the radiation, which causes about 90% of the total photo-electric yield in the tube counter, has wavelengths below 1 000 Å, and that, in air, the absorption coeff. is $\sim 0{\cdot}4$ cm.$^{-1}$ at 200 mm. Hg ($\sim 1{\cdot}5$ cm.$^{-1}$ for 760 mm. Hg), and in H_2 about $\frac{1}{2}$ this value. H. G. S.

537.521.7 : 621.3.015.5 628

The electric spark discharge in different gases. ALLIBONE, T. E., AND MEEK, J. M. *J. Sci. Instrum.*, 21, *pp.* 21–27, *Feb.*, 1944.—A brief résumé is given of fundamental disruptive phenomena in various gases under d.c., a.c. and impulse conditions, in gaps with uniform and non-uniform fields, and for pressures above 1/6 atm. The phenomena discussed include the effect of irradiation on the dispersion of results and the statistical time lag, observation and theories of the formation of the spark in short and long gaps, the effect of corona and polarity on the field distribution in non-uniform gaps, and the flashover voltages in the presence of solid dielectrics bridging the complete gap. R. H. G.

537.523.4 = 3 629

Ignition-channel cross-section and the ignition process with (ultra-violet) irradiation of limited cross-section. FUCKS, W., AND BONGARTZ, H. *Z. Phys.*, 120, *pp.* 468–475, 1943. *English Abstr. in Wireless Engr*, 20, *p.* 497, *Oct.*, 1943.—The ignition channel is the region important for the initiation of the discharge at the moment of instability. The paper describes an experimental investigation, in which (in air at atm. pressure) its radial extension is measured by a procedure utilizing the ignition-potential decreases produced by irradiating a gradually increased amount of cathode surface. E. R. A.

537.523.5 630

Conditions favouring the start of an arc discharge between cold activated electrodes at 50 c./s. PIRANI, M. *Trans. Electrochem. Soc.*, 83, *Prepr. No.* 20, 1943.—The start of an a.c. arc-discharge betw. two activated electrodes in a rare-gas filling takes place in 2 stages: (1) a h.v. glow discharge of low current, (2) a change-over to the l.v. high-current arc discharge. The change-over is favoured by electrodes comprising a pellet of special physical structure and chemical composition producing small amounts of active Ba. E. R. A.

537.523.5 = 3 631

Formation of arc burn traces. WEIZEL, W., AND ROMPE, R. *Z. Phys.*, 119, 5–6, *pp.* 366 *and* 373, 1942.—[See Abstr. 2207 (1940)]. By taking into consideration the radial extent of the arc root and the

non-uniform thermal and electrical characteristics appertaining through the cross-section, the contraction of the arc root, and thereby the reduction of the required voltage to the value of the cathode drop, can be explained. E. R. A.

537.525.3 : 621.3.015.532 632

Corona in gases at low pressures. CRAGGS, J. D., AND MEEK, J. M. *Phys. Rev.*, 64, *pp.* 249–250, *Oct.* 1 *and* 15, 1943.—[Abstr. 486 B (1944)].

537.529 : 621.3.015.5 633

The influence of polarization on the electric breakdown strength and its dependence on temperature. MALMLÖW, G. *Ark. Mat. Astr. Fys.*, 30*B*, 1, [8 *pp.*], 1943.—Describes measurements of the electric strength of mica and KBr under direct and alternating voltages. The arrangement employed was in accordance with von Hippel's method, the specimen being subjected to N_2 in a pressure breakdown vessel. The results obtained show the influence of polarization phenomena with direct voltages. The "true" electric strength of KBr is independent of temperature betw. 220° and 300°K. A. E. T.

537.531 : 535.33 : 530.145.5 *see Abstr.* 561

537.531 : 535.338 634

Theory of the continuous X-ray spectrum: short-wave limit. WEINSTOCK, R. *Phys. Rev.*, 64, *pp.* 276–278, *Nov.* 1 *and* 15, 1943.—An earlier result for the intensity distribution of continuous X-radiation is reduced to applicability at the short-wave limit; this is accomplished by passing to the limit of zero velocity for the scattered electron.

537.531 : 535.4 : 537.533.73 635

Fifth meeting of the American Society for X-ray and electron diffraction. *Phys. Rev.*, 64, *pp.* 312–316, *Nov.* 1 *and* 15, 1943.—Abstracts of papers presented: Design of X-ray equipment, Frankuchen, I.; Design of powder cameras, Brentano, J. C. M.; X-ray studies of preferred orientations, Barrett, C. S.; the gold-silver tellurides, Tunell, G.; Diffraction effects accompanying some ordering reactions, Harker, D.; X-ray study of solid soap phases, Ferguson, R. H.; The relation of crystal habit to space group, Donnay, J. D. H.; X-ray and electron diffraction examination of colloidal materials, Milligan, W. O.; The electron microscope in an X-ray diffraction laboratory, Clark, G. L., and Baylor, M. B.; Ambiguities in X-ray analysis, Patterson, A. L.; X-ray techniques in the quartz oscillator industry, Parrish, W.; X-ray structural study of a series of related polyhalides, Mooney, R. C. L.; Recent developments in the electron microscope, Zworykin, V. K., and Hillier, J.; An evaluation of the sector technique as applied to the diffraction of electrons by gases, Bauer, S. H.

537.531 : 591.176 : 539.185.9 *see Abstr.* 671

537.533 : 530.145.6 = 3 636

Experimental investigations to test the wave-mechanical theory of the field emission of electrons. HAEFER, R. *Z. Phys.*, 116, 9–10, *pp.* 604–622, 1940.—By means of photographs with the electron microscope, the field emission of electrons is investigated at tungsten points having radii of curvature from 16 mμ to 1·3 μ and with a field strength of about 3×10^7 V/cm. to produce the emission. The wave-mechanical theory of the field emission, gained from consideration of the picture intensity, is confirmed for pure tungsten surfaces and for metal surfaces covered with layers of Ba, K and Cs free of crystallite. H. G. S.

537.533.72 : 621.385.833 637

Applied electron microscopy. WATSON, J. H. L. *Canad. J. Res. A*, 21, *pp.* 89–98, *Nov.*, 1943.—[Abstr. 577 B (1944)].

537.533.72 : 621.385.833 = 3 638

Chromatic deviation of electron-optical image systems. WENDT, G. *Z. Phys.*, 116, 7–8, *pp.* 436–443, 1940.—The chromatic deviation of the first order of electron-optical, rotational-symmetrical image systems is derived by a method of the perturbation theory. Three independent error coefficients occur. Two correspond to the known chromatic errors of optics—positional variation of the plane of the image and dimensional variation of the image. The third—variation of the distortion—is a characteristic property of the magnetic image fields of electron optics. H. G. S.

537.533.73 : 535.4 : 537.531 *see Abstr.* 635

537.533.73 : 548.74 = 3 639

Diffraction experiments with very narrow electron beams. BOERSCH, H. *Z. Phys.*, 116, 7–8, *pp.* 469–479, 1940.—The crystalline structure of gold leaf, NH_4Cl and NaCl layers are investigated with narrow electron beams. The asymmetry of the primary ray after passing through the gold leaf is established, and hitherto unknown charge phenomena of insulating foils are found which may lead to the formation of an image of the object. A method is given for determining the position of the source of the diffraction diagram on the object. H. G. S.

537.533.74 : 545.727 640

Analysis of gases by the scattering of electrons. WEST, S. S. *Geophysics*, 8, *pp.* 404–418, *Oct.*, 1943.—Methods are described for the analysis of mixtures of hydrocarbon gases by measurement of the probability of scattering of electrons as a function of energy of impinging electron, angle of scattering, or loss of energy during collision.

537.541 : 535.89 : 537.228.5 *see Abstr.* 623

537.561 = 3 641

Ignition in hydrogen. FUCKS, W., AND KETTEL, F. *Z. Phys.*, 116, 11–12, *pp.* 657–692, 1940.—The law $\Delta U/U = Ki^{1/2}$ (i = photo current, K = const.) is tested experimentally for various pressures p and striking distances L in H_2 and is confirmed. The back-effect in H_2 is studied for ignition with and without irradiation, and in the former case is investigated by measuring the dependence on K of p and L. The variation of K with pL is examined. The curve of the ignition voltages in rel. to pL and the function $\alpha/p = f(E/p)$ are re-determined. Elementary processes incompatible with the laws of similarity must play an important part in the theory of ignition. In the case of H_2, resonance radiation has a special rôle. H. G. S.

537.564 = 3 642

On the excess electrons produced by the photo-effect in a non-self-sustaining discharge in air. COSTA, H. *Z. Phys.*, 116, 7–8, *pp.* 508–514, 1940.—The amount of excess electrons produced by the photo-effect in a Townsend discharge near to disruptive voltage is

investigated by methods similar to those used in the case of H_2 [Abstr. 847 (1940)]. The measurements for H_2 are confirmed (50–100%). In l.p. air (0·72 mm. Hg) the yield amounts to 50%; at higher pressures it is less (about 20% at 7·1 mm. Hg). In addition to the photo-effect there is an effect apparently dependent upon the condition of the surface of the cathode. In this connection it is shown that γ/α increases with E/p in H_2 and air, i.e. the light-quantum yield falls off more slowly than the ionization yield with E/p. H. G. S.

537.567 : 539.164.92 = 3 643

On the dependence on pressure of the columnar ionization by α-rays. HELBIG, E. *Z. Phys.*, 116, 7–8, *pp.* 444–453, 1940.—For air, CO_2, H_2, A_2 and an air-CO_2 mixture the dependence on pressure is determined of the columnar ionization by irradiation with α-rays ⊥ the electric field. The Hoffmann duant electrometer was employed for measuring the ions. Jaffé's theory [Abstr. 321 (1914)] is confirmed for bombardment ⊥ the electric field. Only H_2 and A_2 show large deviations for small field strengths, attributable to the ion loss due to diffusion towards the walls of the measuring chamber. The recombination coefficients are calculated for air and CO_2 at the pressures used. H. G. S.

537.591 : 621.396.91 : 551.508.11 *see Abstr.* 738

537.591.5 644

A note on the mesotron temperature coefficient. BENEDETTO, F. A. *Phys. Rev.*, 64, *pp.* 317–318, *Nov.* 1 *and* 15, 1943.—[See Abstr. 159 (1942)].

537.591.8 = 3 645

Cloud-chamber investigations on the hard secondary rays of cosmic radiation. LIESEGANG, S. *Z. Phys.*, 116, 7–8, *pp.* 515–524, 1940.—The hard secondary rays released in thick Pb layers by cosmic radiation are investigated with a fully automatic cloud chamber. The 2nd max. [Abstr. 202 (1937)] is produced by non-ionizing particles which become ionizing in the secondary radiator. H. G. S.

537.723 : 621.317.733(091.2) 646

The significance of the Bakerian Lecture of 1843. WINTER, H. J. J. *Phil. Mag.*, 34, *pp.* 700–711, *Oct.*, 1943.—[Abstr. 539 B (1944)].

538.082.74 : 621.317.4 647

Electrodynamic determination of the magnetic moment of plates. BENEDIKT, E. T. *Rev. Sci. Instrum.*, 14, *pp.* 43–45, *Feb.*, 1943.—[Abstr. 536 B (1944)].

538.566 : 621.396.11 = 3 648

Radiation from waves in a circular hollow wave guide with an attached plane screen. BUCHHOLZ, H. *Arch. Elektrotechn.*, 37, *pp.* 22–32, *Jan.* 31; 87–104, *Feb.* 28, *and pp.* 145–170, *March* 31, 1943.—[Abstr. 586 B (1944)].

538.566.3 : 621.396.11 649

Phase and group velocity in the ionosphere. HOWE, G. W. O. *Wireless Engr*, 20, *pp.* 577–580, *Dec.*, 1943.—[Abstr. 587 B (1944).]

538.569 : 541.128.3 *see Abstr.* 692

538.612 = 3 650

Magnetic double refraction of alkali-metal vapours. GABLER, F. *Z. Phys.*, 116, 7–8, *pp.* 495–507, 1940.—An experimental arrangement for investigating the Voigt effect by the Babinet wedge method is described. Photographic reproductions are included of the effect for Na, K, Rb and Cs and are analysed. The observations are shown to be in good qualitative agreement with the results from a wave-mechanical theory of the Voigt effect. H. G. S.

538.691 651

On the motion of a charged particle in a magnetic field. ALFVÉN, H. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 22, [20 *pp.*], 1941.—The motion of a charged particle in a non-homogeneous magnetic field under the action of electrical and gravitational forces is treated as a perturbation of the motion in a homogeneous field. The particle is replaced by an "equivalent magnet" of const. moment at the centre of its orbit, and the equations of motion of this magnet are derived. The method applies to almost all physical cases except that of cosmic rays in the Earth's field. A. HU.

539.13 = 3 652

Intensity distribution in the quartet-doublet bands. I. BUDÓ, A., AND KOVÁCS, I. *Z. Phys.*, 116, 11–12, *pp.* 693–700, 1940.—With the aid of the eigenfunctions established for a 3-electron molecular model, the intensity distribution in the various branches of the inter-combination bands $^4\Sigma\pm - {}^2\Sigma\pm$, $^4\Sigma\pm - {}^2\Sigma\mp$, $^4\Sigma - {}^2\Pi(a)$, $^4\Sigma - {}^2\Pi(b)$ is computed. H. G. S.

539.133 = 3 653

On the electron spin paramagnetism of the molecules. NEUGEBAUER, T. *Z. Phys.*, 116, 7–8, *pp.* 428–435, 1940.—The paramagnetic susceptibility and the Cotton–Mouton constants are derived for the case when the spin moment which exists is regarded as incompletely free. From the experimental values for the O_2 molecule it follows that the mean square of the magnetic moment along the axis of rotation is 1·3% greater than in the direction at rt. angles to it. This agrees with the qualitative results from band spectra. Remarks on the odd multi-atomic molecules are appended. H. G. S.

539.133 : 537.226.1 : 532.61 : 532.739.2 = 3 654

On the state of solution of highly polymerized substances. I. Activity of solvents against acetyl- and nitro-cellulose and their mixtures. TAKEI, M. *Kolloid Z.*, 98, *pp.* 312–318, *March*, 1942.—The activity factor $\mu^2/\varepsilon\sigma$ (μ = dipole moment, ε = permittivity, σ = surface tension) previously proposed [Abstr. 1021 (1942)] is important in connection with the ranges of solubility of different cellulose esters. Acetyl cellulose is soluble in solvents of small, nitro-cellulose in solvents of large activity factors. Mixtures of both show a regular shift of solubility. These and other regularities were confirmed by quantitative determinations of solubilities of cellulose derivatives in homologous acetates. R. N.

539.152 : 530.145.6 = 3 655

Concept of the Atom. III. SCHERRER, W. *Helv. Phys. Acta*, 16, 3, *pp.* 230–234, 1943.—A mathematical paper in which the idea of wave-mechanical inertia is developed. [See Abstr. 215 (1943)]. A. J. M.

539.152.1 = 3 656

Theory of meson fields with strong coupling to nucleons. WENTZEL, G. *Helv. Phys Acta*, 16, 3,

pp. 222–224, 1943.—Presents some calculations referring to pseudo-scalar and vectorial fields and to mixtures of these two types of fields. A. E. T.

539.152.2 : 535.338.332 = 3 *see Abstr.* 595

539.155.2 : 546.32 657

The relative abundance of the isotopes of potassium in Pacific kelps and in rocks of different geologic age. Cook, K. L. *Phys. Rev.*, 64, *pp.* 278–293; *Nov.* 1 *and* 15, 1943.—The Dempster double focusing mass spectrograph was used to determine the K^{39}/K^{41} isotope ratio in Pacific kelps, fossils and rocks of different geologic age. Within the 1% accuracy obtainable, the ratio for the kelps and 2 Upper Cambrian fossils is the same as that of rocks. Rocks whose ages vary from Early-pre-Cambrian to Tertiary show no measurable difference. The average value of the ratio was $14{\cdot}12 \pm 0{\cdot}28$. Fluctuations in the ratio are attributed to isotope effects of the hot-filament ion source.

539.155.2 = 3 658

Statistics of the isotope distribution in particles deposited by condensation. Holleck, L. *Z. Phys.*, 116, 9–10, *pp.* 624–631, 1940.—The assumptions are examined for an isotope separation on the basis of density variations of particles deposited by condensation. The abundance ratio of the Li isotopes ^{7}Li and ^{6}Li is determined and their dependence on particle size discussed. With particles of the dimensions of colloids, isotope fractionation is not to be expected. H. G. S.

539.155.2 : 539.163.2 = 3 *see Abstr.* 666

539.16.08 = 3 659

Apparatus for coincidence measurements of very high resolving power. Bradt, H., and Scherrer, P. *Helv. Phys. Acta*, 16, 3, *pp.* 251–258, 1943.—A circuit which will give a resolving power of $0{\cdot}8 \times 10^{-7}$ sec. for the shortest time between two discharges which will register as non-coincident is given. A circuit is also described for anti-coincidence mixing. A calculation is made of the limit of useful resolving power. A. J. M.

539.16 : 615.84 660

Limitations of physics in radium therapy. Parker, H. M. *Radiology*, 41, *pp.* 330–336, *Oct.*, 1943.—Physical conceptions with resp. to dosage are discussed in ref. to the solutions offered by Paterson and Parker. Perfect distribution is modified in practice by absorption and scattering. The replacement of a radium ring by symmetrically arranged radium tubes presumes proper packing and distribution of the radium salt, which may not occur in practice. B. J. L.

539.16.08 661

Resonance in $B^{11} + H^1$. Jacobs, J., and McLean, W. B. *Proc. Iowa Acad. Sci.*, 48, *p.* 308, 1941.—Yield-energy curves for the reaction $B^{11} + H^1$, using a gas target, were obtained with an ionization chamber set to count all α particles of range $> 2{\cdot}0$ cm., $2{\cdot}5$ cm., $3{\cdot}0$ cm. and $3{\cdot}5$ cm.; α particles of all ranges show resonance at (158 ± 3) ekV. The energy of the bombarding protons was obtained by using the 330 ekV resonance in the yield of γ rays from the reaction $F^{19} + H^1$ as a std. The apparent ½-width for the F and B reactions is 6 ekV.

539.163 662

Disintegration schemes of radioactive substances. V. I^{130}. Roberts, A., Elliott, L. G., Downing, J. R., Peacock, W. C., and Deutsch, M. *Phys. Rev.*, 64, *pp.* 268–275, *Nov.* 1 *and* 15, 1943.—[See Abstr. 229 (1943)]. The disintegration of I^{130} was studied by spectrometer and coincidence techniques. The decay proceeds by 2 modes of negatron emission of max. β-ray energy $(0{\cdot}61 \pm 0{\cdot}02)$ eMV and $(1{\cdot}03 \pm 0{\cdot}02)$ eMV, respectively. The high-energy spectrum represents (60 ± 10)% of the disintegrations and is accompanied by 3 γ-rays of energies $(0{\cdot}537 \pm 0{\cdot}005)$ eMV, $(0{\cdot}667 \pm 0{\cdot}008)$ eMV, $(0{\cdot}744 \pm 0{\cdot}010)$ eMV. The low-energy spectrum is accompanied by the same 3 γ-rays and, in addition, by a γ-ray of energy $(0{\cdot}417 \pm 0{\cdot}005)$ eMV. The coefficients of internal conversion in the K shell are $0{\cdot}0031$, $0{\cdot}0038$, $0{\cdot}0069$, $0{\cdot}012$, ($\pm$ 20%) in order of decreasing γ-ray energy. The conversion in the L shell is much smaller. The Fermi plot of the complex spectrum can be separated into straight lines which may be extrapolated to obtain the correct disintegration energies.

539.163 = 3 663

Disintegration constant and half-life period of ThC′. Bradt, H., and Scherrer, P. *Helv. Phys. Acta*, 16, 3, *pp.* 229 and 259–264, 1943.—Dunworth's application of the coincidence method has been used to determine the very short half-life period of ThC′ [Abstr. 226 (1941)]. The coincidence rate of Th β-rays and ThC′ α-rays depends on the resolving power of the coincidence mixing. The disintegration const. of ThC′ is $(2{\cdot}7 \pm 0{\cdot}4)10^6$ sec.$^{-1}$, and the half-life period is $(2{\cdot}6 \pm 0{\cdot}4)10^{-7}$ sec. A. J. M.

539.163.2 664

On the radioactivity of gold. Norling, F. *Ark. Mat. Astr. Fys.*, 27*B*, 3, *No.* 9, [5 *pp.*], 1941.—Coincidence measurements (β–γ and γ–γ) in radioactive gold are reported and a tentative interpretation given. A. Hu.

539.163.2 = 3 665

The gamma radiation associated with complex beta spectra. Stahel, E., and Dancoff, H. *Helv. Phys. Acta*, 16, 3, *p.* 225, 1943.—A preliminary note. A. E. T.

539.163.2 : 539.155.2 = 3 666

The β-disintegration of RaA and the formation of element 85. Labhart, H., and Medicus, H. *Helv. Phys. Acta*, 16, 3, *pp.* 225–226, 1943.—The conclusion is reached that the formation of the 218 isotope of element 85 still remains an open question, and that only the 211 isotope, which is artificially prepared from Bi, is known with certainty. A. E. T.

539.163.4 : 621.892 667

Radio-sulphur tracer study of sulphurized lubrication addition agents. Clark, G. L., Gallo, S. G., and Lincoln, B. H. *J. Appl. Phys.*, 14, *pp.* 428–434, *Aug.*, 1943.—Certain S-containing organic compounds, when blended with lubricating oils, increase the film strength and inhibit oxidation. The paper reports an investigation into the mechanism of this action, whereby radioactive tracer technique is employed to ascertain the conc. of such an addition agent in oil blends on metallic surfaces. The active

element used is radio-sulphur, prepared with the cyclotron and introduced into the olefin molecules. Experimental technique and results are described, and conclusions are derived. A. E. T.

539.164.92 : 537.567 = 3 *see Abstr.* 643

539.166.1 668

The energies of the γ-rays from Sb^{122}, Cd^{115}, Ir^{192}, Mn^{54}, Zn^{65}, and Co^{60}. MANDEVILLE, C. E., AND FULBRIGHT, H. W. *Phys. Rev.*, 64, *pp.* 265–267, *Nov.* 1 *and* 15, 1943.—The energies were determined by a magnetic spectrograph. The results, in eMV, were Sb^{122}: $0{\cdot}80 \pm 0{\cdot}02$; Cd^{115}: $0{\cdot}65 \pm 0{\cdot}02$; Ir^{192}: $0{\cdot}63 \pm 0{\cdot}02$; Mn^{54}: $0{\cdot}86 \pm 0{\cdot}02$; Zn^{65}: $1{\cdot}14 \pm 0{\cdot}02$; Co^{60}: $1{\cdot}33 \pm 0{\cdot}03$. The quantum energies were obtained from the end points of distributions in momentum of Compton secondaries arising from the several γ-rays. Qualitative results obtained from observations on several other γ-ray emitters are briefly discussed.

539.17 : 621.384 669

Some engineering aspects of nuclear physics. BLEKSLEY, A. E. H. *Trans. S. Afr. Inst. Elect. Engrs*, 34, *pp.* 89–108, *July*, 1943.—[Abstr. 574 B (1944)].

539.185.7 = 3 670

Behaviour of rare earths under neutron bombardment. MEITNER, L. *Ark. Mat. Astr. Fys.*, 27*A*, 3, *No.* 17, [18 *pp.*], 1941.—The effective cross-section for the absorption of thermal neutrons in Dy is found to be 870×10^{-24} cm.^{2}, with an uncertainty of 10%. A method is developed for estimating the rôle played by the various Dy isotopes in the absorption, and it is concluded that at least 2 yield comparable cross-sections, and that possibly they are all represented roughly in proportion to their abundances. The emission of appreciable γ-radiation from Dy^{165} is confirmed. A method of analysing a mixture of rare earths by neutron bombardment is described, and its results confirmed by X-ray spectrograms. A. HU.

539.185.9 : 537.531 : 591.176 671

Differential tissue response to neutron and roentgen radiations. LAMPE, I., AND HODGES, F. J. *Radiology*, 41, *pp.* 344–350, *Oct.*, 1943.—Unlike X-rays, neutron rays may effect sterilization of testes without damage of the covering tissues. Fractionation of dosage, as used in X-ray therapy to minimize damage of the covering tissues, has not yet been tried. B. J. L.

539.214 : 531.259.2 *see Abstr.* 565

539.215 : 539.217.3 : 632.94 672

Some new properties of inorganic dusts. BRISCOE, H. V. A. *J. Roy. Soc. Arts*, 91, *pp.* 593–607, *Oct.* 15, 1943.—Describes a study of mineral dusts to determine what properties are responsible for their lethal effects on insects. Chemical action was ruled out. The cause is some property related with hardness. The effects of grinding conditions and of modifying the surface of dusts were examined, and explanations for the observed results are advanced. The tissues of insects killed with dusts were desiccated. In considering the mechanism of this desiccation, it seemed that the dusts increase the transmission of water through the insect's hard cuticle. It was possible to simulate this effect in experiments on artificial membranes. A. E. T.

539.215 : 539.217.5 673

A simplified air-permeability fineness apparatus. BLAINE, R. L. *Bull. Amer. Soc. Test. Mater.*, *No.* 123, *pp.* 51–55, *Aug.*, 1943.—New apparatus is described which has been designed for measuring the fineness of granular materials by means of the air permeability method. Results of tests with Portland cement are discussed. E. R. A.

539.215.9 : 551.311.234 : 627.4 674

An engineering study of glacial drift for an earth dam, near Fergus, Ontario. LEGGET, R. F. *Engng J. Can.*, 26, *pp.* 502–508, *Sept.*, 1943.—[Abstr. 649 B (1944)].

539.216.1 : 535.551 = 3 675

Deformation and orientation of isotropic nitrocellulose threads. III. Double refraction of swollen and imbibed fibres. KRUYT, H. R., VERMAAS, D., AND HERMANS, P. H. *Kolloid Z.*, 100, *pp.* 111–121, *July*, 1942.—[See Abstr. 241 (1943)]. The optical behaviour of nitrocellulose threads elongated in alcohol, mixtures of alcohol and acetone and of solutions of potassium mercury iodide, toluol and tetrachlorethane, is investigated. The linearity is not observable for double refraction caused by small rods. Adsorptional double refraction, if referred to the dry state, shows the linearity in general, except for threads slightly elongated in alcohol. This behaviour is explained by changes in the state of crystallization. R. N.

539.216.1 : 541.183.1 = 3 676

Alumina fibre and its application as an adsorbent for adsorption measurements and chromatoscopy. WISLICENUS, H. *Kolloid Z.*, 100, *pp.* 66–82, *July*, 1942.—A comparison is made between organic fibres and the inorganic alumina fibre. Natural fibres are too brittle, too bulky and not sufficiently elastic for use as adsorbent; specially prepared fibres are required. The activation of the Al by Hg halides is similar for both kinds. The process of preparation of the fibres, their uses in adsorption measurements, and automatic adsorption apparatus, are described and illustrated. R. N.

539.216.1 : 677.31 677

Structure of the wool fibre as revealed by the electron microscope. HOCK, C. W., AND MCMURDIE, H. F. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 229–236, *Oct.*, 1943.—Over a wide range of magnifications the cortical cells always showed a distinctly fibrous structure. The electron microscope made possible the resolution of fine microfibrils. The scale cells showed little internal organization.

539.217 : 553.98 *see Abstr.* 756

539.217 : 676 *see Abstr.* 762

539.217.3 : 632.94 : 532.72 *see Abstr.* 577

539.217.3 : 632.94 : 539.215 *see Abstr.* 672

539.217.5 : 539.215 *see Abstr.* 673

539.217.5 : 676 678

Air permeability of paper (TAPPI tentative standard T460m-43). *Paper Tr. J.*, 117, *pp.* 27–28, *Sept.* 16, 1943.—A method is described for testing paper and paper products which permit the passage of 100 ml. of air in from 2 sec. to 30 min., except such as cannot be securely clamped against surface leakage (crêpe and corrugated papers). E. R. A.

539.23 : 621.793 679

Methods of depositing metallic films. WEIN, S. *Electronics*, 16, *pp.* 110–113 *and* 248–253, *Sept.*, 1943.—[Abstr. 630 B (1944)].

539.26 : 548.73 *see Abstr.* 723

539.26 : 778.3 : 621.386.83 680

Film shrinkage in X-ray analysis. ROOKSBY, H. P. *Photogr. J.*, 83, *pp.* 299–303, *Aug.*, 1943.—[Abstr. 581 B (1944)].

539.262 : 621.386.1 681

X-ray tubes for spectroscopical purposes. SIEGBAHN, M. *Ark. Mat. Astr. Fys.*, 28*B*, 1, *No.* 4, [4 *pp.*], 1942.—[Abstr. 579 B (1944).

539.377 : 536.413 = 3 682

A universal instrument for thermodynamic analysis of highly elastic changes of state. The optical linear dynamometer-dilatometer. WÖHLISCH, E. *Kolloid Z.*, 100, *pp.* 151–153, *July*, 1942.—An instrument is described for determining thermal changes of elastic tension at const. length, and thermal changes of length with const. tension. R. N.

539.377 : 536.421.4 : 666 = 3 683

The freezing temperature of high-molecular glasses and their chemical constitution. JENCKEL, E. *Kolloid Z.*, 100, *pp.* 163–170, *July*, 1942.—All non-crystalline substances, silicate glasses, organic resins and high-molecular substances, show a transitional stage or freezing range at which the change of volume with change of temp. varies rapidly. The influence of chemical constitution on f.t. and the rel. of viscosity to chain characters of high-mol. substances are discussed. [See Abstr. 1125 (1942)]. R. N.

539.378.6 : 661.713 : 679.5 = 3 684

On the influence of the milling process on the properties of highly polymerized substances (cellulose and polystyrol) and on the nature of its effect. II. HESS, K., STEURER, E., AND FROMM, H. *Kolloid Z.*, 98, *pp.* 290–304, *March*, 1942.—[See Abstr. 2726 (1942)]. A theoretical investigation on impact energy, impact forces and compressive stresses, in a ball mill show that the impact energies are sufficient for overcoming the atomic forces in the molecules, but the compressive stresses suffice only for overcoming van der Waals forces, not main valency bonds, unless it may be assumed that the material to be milled covers the balls discontinuously and causes local increases of compressive stress. Theory and experiment show that the milling process consists in a direct transformation of the impact energy of the balls into molecular oscillation energy of the particles of the substance to be milled. R. N.

539.4/.5 : 620.17 : 669.14 685

Leaded manganese-molybdenum steel. SWINDEN, T. *J. Iron Steel Inst.*, [20 *pp.*], 1943. *Advance copy.*—[Abstr. 678 B (1944)].

539.4.016.2 : 548.73 *see Abstr.* 724

539.41 : 679.56 = 3 *see Abstr.* 765

539.434 686

Creep and relaxation of oxygen-free copper. DAVIS, E. A. *J. Appl. Mech.*, 10, *A*101–*A*105, *Sept.*, 1943.—The paper contains results of creep and relaxation tests at up to 235°C.

539.501 : 591.175 *see Abstr.* 759

539.501 : 679.562 687

Soybean-modified phenolic plastics. MCKINNEY L. L., DEANIN, R., BABCOCK, G., AND SMITH, A. K. *Industr. Engng Chem.*, 35, *pp.* 905–908, *Aug.*, 1943.—[Abstr. 691 B (1944)].

539.533 : 665.45 688

Surface-consistency characteristics of asphalts. KNOWLES, E. C., AND MCCOY, F. C. *Industr. Engng Chem.*, 35, *pp.* 1118–1122, *Oct.*, 1943.—A modification of the A.S.T.M. asphalt penetration method used to investigate consistency characteristics of asphalt surfaces from 0·04–0·30 cm. thick, is described. The modified procedure is based upon the load (in g.) required to force the A.S.T.M. needle into the asphalt to a given depth in a const. time. E. R. A.

539.56 : 620.178.786 : 678 689

Brittle points of natural and synthetic rubber stocks. MORRIS, R. E., JAMES, R. R., AND WERKENTHIN, T. A. *Industr. Engng Chem.*, 35, *pp.* 864–867, *Aug.*, 1943.—[Abstr. 686 B (1944)].

541.123.3 : 669.14 *see Abstr.* 761

541.123.31 690

Study of the three-component system diethyl-ether–water–magnesium-bromide at 25°C. ROWLEY, H. H., AND BARTZ, M. H. *Proc. Iowa Acad. Sci.*, 48, *p.* 276, 1941.—Varying amounts of the components were brought together in a tube and allowed to come to equilibrium at 25°C., atm. pressure. The composition of each of the condensed phases, solid and liquid, was determined by analysis and a 3-component diagram of the phases in equilibrium was made. Two independent pairs of partly miscible liquids were found: (1) a water and an ether layer with a small amount of $MgBr_2$ dissolved in the ether layer, (2) 2 ether layers, with considerable $MgBr_2$ in one of the layers. Two solids were found that can exist in equilibrium with liquid phases at 25°C., $MgBr_2 . 6 H_2O$ and $MgBr_2$ di-etherate. No evidence was found for the existence of a "mixed solvate" or the basic $MgBr_2$ di-etherate.

541.123.4 : 532.69 *see Abstr.* 576

541.124 : 541.64 = 3 *see Abstr.* 710

541.124 : 621.775.7 = 3 691

The sintering processes in powders consisting of a single component. A contribution to elucidating the processes of metal ceramics and oxide ceramics. 3rd comprehensive communication on the course of chemical processes in which solid substances are concerned. HÜTTIG, G. F. *Kolloid Z.*, 98, *pp.* 263–286, *March*, 1942.—[See Abstr. 2031 (1943)]. A schematic representation of the phenomenology of the sintering process is followed by a discussion of the different theories. The elementary processes, the changes which a single crystal undergoes with gradually increased temperature and the processes leading to the coalescence of 2 adjacent crystals into a single crystal, are described. The changes of properties observed during the sintering process are investigated and a model is given for the process subdivided into 6 consecutive periods characterized by some dominant feature, viz. increase of contact surface by adhesive forces, activation by surface diffusion, de-activation and increase of fritting effect, activation by lattice diffusion, progressive de-activation and ageing, activation as preparation to fusing. R. N.

541.124.7 : 541.57 = 3 *see Abstr.* 708

541.128.3 : 538.569 = 3 692

Activation of catalytic substances by electric waves. HEDVALL, J. A., AND ALGREN, G. A. *Kolloid Z.*, 100, *pp.* 137–140, *July*, 1942.—The catalytic action of metal powders is increased by irradiation with electromagnetic waves. This explains the coherer effect due to the generation of active centres formed by sintered bridges. The experiments were made by investigating the catalytic decomposition of N_2O in the presence of Ni by means of a flue-gas analyser. R. N.

541.132 : 537.226.2 693

The electrostatic contribution to hindered rotation in certain ions and dipolar ions in solution. I–III. HILL, T. L. *J. Chem. Phys.*, 11, *pp.* 545–557, *Dec.*, 1943, *and* 12, *pp.* 56–61, *Feb.*, 1944.—From exp. determined dissociation const. and structural parameters, effective permittivities are calculated for a few substances. This allows an estimate of the electrostatic contribution to hindered rotation. For dithionic acid, whose dissociation const. are not known, a D_E must be assumed in order to make the same calculation for the various possible ionic species. The influence of these results on ionic equilibria in dithionic acid is discussed. The treatment of ethylene diamine, oxalic acid, glycine, α-alanine, leucine, α-amino butyric acid, and dithionic acid is extended to analogous compounds with one additional angle of rotation: 1,3-propane diamine, malonic acid, β-alanine, and pyrophosphoric acid. The methods are extended to glutamic acid.

541.132.3 : 535.343-31 694

The assay of potassium *p*-phenolsulphonate, its *p*H range, and its ultra-violet absorption spectrum. SAGER, E. E., SCHOOLEY, M. R., AND ACREE, S. F. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 197–204, *Oct.*, 1943.—K *p*-phenolsulphonate is a good buffer for *p*H 8·4 to 9·2 and for spectrophotometric studies of metacresolsulphonphthalein and thymolsulphonphthalein. A pure product may be obtained after 3 recrystallizations. A quantitative method of analysis by bromometric titration was developed. Ultra-violet absorption spectra were obtained and showed differences betw. primary and secondary salt. The sulphonate group is almost completely ionized in dilute solutions.

541.132.3 : 536.7 695

The second dissociation constant of *p*-phenolsulphonic acid and *p*H values of phenolsulphonate-chloride buffers from 0° to 60°C. BATES, R. G., SIEGEL, G. L., AND ACREE, S. F. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 205–223, *Oct.*, 1943.—The thermodynamic dissociation const. of the phenol group of *p*-phenolsulphonic acid was calculated from e.m.f. measurements of H/AgCl cells without liquid junction; 39 buffer mixtures of K*p*-phenolsulphonate and NaOH/NaCl were studied from 0–60°C. at 5° intervals. The values of pK_2, the neg. of the common log. of the second dissociation const. are given by $pK_2 = 1\,961{\cdot}2/T - 1{\cdot}1436 + 0{\cdot}012139T$, where T is °K. Equations were formulated to give the changes of free energy, heat content, entropy and heat capacity, at inf. dilution, of a mole of phenolsulphonate ion. The *p*H value of each buffer-chloride mixture was calculated from the experimental data and the activity coefficients. The *p*H values of other phenolsulphonate buffers which have molal ratios, m_1/m_2, of phenolsulphonate ion to bivalent phenolate-sulphonate ion between 2/3 and 1 can be computed betw. 0 and 60°C. from their compositions and from the dissociation constants and ionic parameters given.

541.132.3 : 621.187.1 696

The *p*H value of boiler feedwater. REES, R. L., AND JACKSON, J. *Engineer, Lond.*, 173, *pp.* 247–250, *Sept.* 24, 1943.—Abstr. 476 B (1944)].

541.134 : 621.317.32 697

Pohl commutator adapted for sum and difference of two cells. KELKAR, V. N. *J. Univ. Bombay*, 12, *pp.* 88–89, *Nov.*, 1943.

541.18 = 3 698

Physico-chemical metastases. OSTWALD, W. *Kolloid Z.*, 100, *pp.* 2–57, *July*, 1942.—Metastases are defined as transitional states between "stases," the latter being a more general conception than phases. Phases presuppose a discontinuity in the transition from one to another, while in the case of stases the transition may be continuous. A distinction is made between (1) dimensional metastases, comprising dispersion, deformation and "methoric" (boundary layer) metastases; (2) simple and complex aggregational metastases, (3) order metastases, ref. to crystalline and amorphous states. Numerous examples are given and the extensive literature is critically surveyed. R. N.

541.18 : 547.458.6 = 3 699

Foundations for a colloid chemistry of amyloses. SAMEC, M. *Kolloid Z.*, 100, *pp.* 106–110, *July*, 1942.—Describes the properties and changes of state of amyloses and states 24 problems, study of which may lead to a better understanding of the behaviour of the starch substances. R. N.

541.18 : 621.357 = 3 700

On the influence of colloids on the electrolytical precipitation of metals at the cathode. MÜLLER, F. *Kolloid Z.*, 100, *pp.* 159–162, *July*, 1942.—A survey of problems connected with the presence of colloidal substances in electrolytic processes involving metals. R. N.

541.18 : 631.4 = 3 701

After 34 years: on the question of soil maturing. Still a big task for applied colloid chemistry. EHRENBERG, P. *Kolloid Z.*, 100, *pp.* 83–97, *July*, 1942.—A survey of different methods of maturing agricultural soil, their characteristic features and their dependence on natural and cultural influences. The effects of maturing for fighting against damaging influences (erosion), the causes for lacking success and the future prospects and tasks, are discussed. R. N.

541.18 : 77.012 = 3 702

Colloid chemistry and photography. LÜPPO-CRAMER. *Kolloid Z.*, 100, *p.* 98, *July*, 1942.—A brief report on the author's contributions reg. applications of colloid chemistry to the problem of photographic layers. Questions of dispersity, germ formation and solarization are reviewed. R. N.

541.18.043 : 541.24 : 547.458 = 3 703

Sedimentation and diffusion measurements on the water-soluble polysaccharide from larchwood. MOSIMANN, H., AND SVEDBERG, T. *Kolloid Z.*, 100, *pp.* 99–105, *July*, 1942.—The speed of sedimentation of the

polysaccharide was determined by ultracentrifuge; it consists of one uniform component with mol. wt. 16 000, and one probably uniform component with mol. wt. 100 000. R. N.

541.182.5 : 532.13 = 3 *see Abstr.* 574

541.182.6 : 534.25 = 3 704

On the theory of the acoustic double refraction of colloidal solutions. OKA, S. *Z. Phys.*, 116, 9–10, *pp.* 632–651, 1940.—The dielectric action of the supersonic field on suspensions of disc-shaped particles, disregarding reciprocal actions, is dealt with, and their acoustic double refraction is investigated theoretically, both for the stationary case and on the removal of the sound field. During the latter process the variation in intensity of the double refraction with time can be represented by an exponential function. The relaxation time is computed for various dimensions of the particles and for liquids of different viscosity. H. G. S.

541.183.1 : 539.216.1 *see Abstr.* 676

541.183.1 = 3 705

Investigation of the adsorption of gases from lowest to highest pressures. I. Mathematical analysis of the equations of the ideal absolute and the differential adsorption. ANTROPOFF, A. VON. *Kolloid Z.*, 98, *pp.* 249–257, *March*, 1942.—Langmuir's adsorption isotherm is shown to be valid for the whole range of pressure and density only if absolute adsorption is considered, i.e. if the total amount of gas present in the adsorption room is taken into consideration. But only the surplus gas which would be present in the room without adsorption taking place can be measured. Different expressions are given for this differential adsorption, as functions of pressure or density, respectively. These expressions are investigated analytically. R. N.

541.183.26 : 621.314.65.032.11 706

The adsorption of gases by the steel walls of vacuum discharge apparatus and its bearing on the life of mutators. DECK, W. *Brown Boveri Rev.*, 29, *pp.* 202–204, *Aug.*, 1942.—[Abstr. 497 B (1944)].

541.24 : 532.133 = 3 707

Remarks on K. H. Meyer's paper "On viscosity and molecular weight of highly polymerized substances." STAUDINGER, H. *Kolloid Z.*, 98, *pp.* 330–332, *March*, 1942.—A polemical note on Meyer's article [Abstr. 1547 (1943)] and some experimental proofs for the validity of the author's viscosity law for linear macromolecular compounds. R. N.

541.24 : 547.458 : 541.18.043 *see Abstr.* 703

541.57 : 541.124.7 = 3 708

Combination energy of individual combinations and dissociation energy of multi-atomic molecules. WEHRLI, M. *Helv. Phys. Acta*, 16, 3, *p.* 204, 1943.—Starting from the valency-force model, study is made of the difference betw. the combination energies δ of the individual combinations and the observed dissociation energies D, particularly for tri-atomic molecules. This is a preliminary note. A. E. T.

541.62 = 3 709

On the infra-molecular rotation with single carbon-carbon bond. MIZUSHIMA, S., AND MORINO, Y. *Z. Phys.*, 119, 3–4, *pp.* 188–194, 1942.—Dipole measurements and Raman-effect investigations show that in the solid state there is only 1 definite configuration. In the liquid and gaseous states, equilibrium sets in rapidly between 2 layers having different azimuths (rotation isomerism). Neohexane has only 1 molecular form. H. G. S.

541.64 : 541.124 = 3 710

Conceptional and mathematical treatment of the decomposition of particle size in cellulose. MATTHES, A. *Kolloid Z.*, 98, *pp.* 319–329, *March*, 1942.—By introducing the notion of "degree of decomposition," being the inverse of degree of polymerization, into the theory of the kinetics of depolymerization, the mathematical treatment of these processes is simplified. Reactions of zero, first and second order may be defined and stoichiometric considerations are eased. For calculating the degree of decomposition, the osmometric degree of polymerization must be used as the viscosimetric values are not suitable owing to the variable particle size during decomposition. The relation betw. the ratios of osmometric and viscosimetric deg. of polymerization, and of viscosimetric deg. and deg. of decomposition, are represented by graphs [see Abstr. 2205 (1941)]. R. N.

541.68 : 532.133 *see Abstr.* 575

542.77 711

An improved pressure-regulating device. WARNER, B. R. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 637–638, *Oct.* 15, 1943.—A manostat capable of controlling a large range of pressures over a large range of flows is described. The method of operation is given and the limiting conditions for its use are stated in terms of equations and graphs.

542.77 712

Automatic pressure-regulating manometer. GILMONT, R., AND OTHMER, D. F. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 641–642, *Oct.* 15, 1943.

542.8 : 621.383 713

Apparatus for photo-electric titrations. Application to dark-coloured resins. OSBORN, R. H., ELLIOTT, J. H., AND MARTIN, A. F. *Industr. Engng Chem.* (*Analyt. Edit.*), 15, *pp.* 642–646, *Oct.* 15, 1943.—[Abstr. 572 B (1944)].

543.812 : 621.317.39 714

Hygrophone moisture-content-measuring instrument. TAMM, A. MÜHLE, 77, *pp.* 715–716, 1940. *Abstr. in J. Text. Inst.*, 34, *A*417, *Aug.*, 1943.—[Abstr. 533 B (1944)].

545 : 669.1 715

The determination of sulphur and phosphorus in pig iron. *J. Iron Steel Inst.*, [16 *pp.*], 1943. *Advance copy.*—[Abstr. 674 B (1944)].

545.727 : 537.533.74 *see Abstr.* 640

545.82 : 535.343.3-1 *see Abstr.* 600

546.17 : 535.338.42 = 3 *see Abstr.* 598

546.32 : 539.155.2 *see Abstr.* 657

546.41 : 535.333 *see Abstr.* 594

547.458 : 541.24 : 541.18.043 = 3 *see Abstr.* 703

547.458.6 : 541.18 = 3 *see Abstr.* 699

547.979.3 : 535.566.2 = 3 *see Abstr.* 605

548.0 : 534 = 3 716

Natural motions in crystal lattices. DEHLINGER, U., AND KOCHENDÖRFER, A. *Z. Phys.*, 116, 9–10, *pp.* 576–585, 1940.—The discussion deals with the thermal

xcitation of atomic jumps, the migration of the dis-ortion states through the lattice, chain reactions, slip, nd long-wave vibrations as an intermediate phase etween the normal and the aperiodic natural ibrations. H. G. S.

548.0 : 535.66 = 3 717

On mechanical and optical "excitation" of colour entres. SMEKAL, A. *Z. Phys.*, 116, 9–10, *pp.* 525–46, 1940.—A comprehensive discussion of the xcitation phenomena at the colour centres of salt rystals with or without impurities. With pure rystals, the items considered are the nature and tructure sensitivity of the F_2-centres, F′-centres in eformed, lightly strained crystals, whether F′-centres xist, and F′-centres in strained pure crystals. As egards crystals with impurities, the colour properties of crystals containing indissoluble foreign atoms, and he mech. and optical excitation of the colour ands of NaCl crystals containing $SrCl_2$, are dealt with. H. G. S.

548.0 : 537.228.1 = 3 *see Abstr.* 619, 620

548.0 : 537.228.3 = 3 *see Abstr.* 622

548.0 : 621.396.611.21 : 621.316.726 : 537.228.1 = 3 *see Abstr.* 621

548.33 : 537.226.2 718

Polymorphism and dielectric constant. GOKHALE, S. D., PHALNIKER, N. L., AND BHAVE, S. D. *J. Univ. Bombay*, 12, *pp.* 75–80, *Nov.*, 1943.—Data are plotted and discussed for the permittivities, measured over a emp. range at $\lambda\lambda 520$ and 90 m., of the α and β forms of resorcinol, *o*- and *p*-nitrophenol, and *o*- and *p*-chlorophenol. Values of the transition temps. are found from the above measurements. N. M. B.

548.55 = 3 719

Contributions to the electronics at natural cleavage surfaces of single crystals of metals. I. Formation of single-crystal cleavage surfaces of zinc in the high vacuum and introductory photo-electric measurements. KLUGE, W., AND STEYSKAL, H. *Z. Phys.*, 116, 7–8, *pp.* 415–427, 1940.—The principles of the method of single-crystal cleavage in high vacua [Abstr. 3979 (1938)] are explained in detail, and the results obtained with Zn are described. The photo-electric observation of the speed of fatigue on a (0001)-cleavage surface of a Zn single crystal shows that, in a vacuum of about 10^{-7} mm. Hg, measurements are possible which enable extrapolation to the state of greatest surface purity. The wavelength limit of the (0001)-plane of the Zn crystal at a pressure of 10^{-5} mm. Hg amounted to $(290 \pm 0{\cdot}7)$ mμ, the associated exit work to 4·26 eV. H. G. S.

548.73 720

On the axial lengths of phloroglucin dihydrate crystals. BOSE, C. R., AND SEN, R. *Indian J. Phys.*, 17, *pp.* 163–165, *June*, 1943.—The values obtained are $a = 6{\cdot}740$ Å, $b = 8{\cdot}090$ Å, $c = 13{\cdot}604$ Å. The axial ratios determined from goniometric measurements of the crystal are $a : b : c$: 0·8324 : 1 : 3·366. The density of the crystal is 1·453 g./cm.^{3}

548.73 721

Reciprocal Lorentz-polarization factor charts for equi-inclination Weissenberg photographs. LU CHIA-SI. *Rev. Sci. Instrum.*, 14, *pp.* 331–335, *Nov.*, 1943.—Two charts are given, which will furnish simple templates to be used directly on the Weissenberg photographs or on the reciprocal lattice nets drawn to an appropriate scale.

548.73 722

X-ray patterns of hydrated calcium silicates. MCMURDIE, H. F., AND FLINT, E. P. *J. Res. Nat. Bur. Stand., Wash.*, 31, *pp.* 225–228, *Oct.*, 1943.—X-ray powder diffraction data of 15 hydrated Ca silicates are reported.

548.73 : 539.26 723

Divergent-beam X-ray photography. LONSDALE, K. *Nature, Lond.*, 153, *pp.* 22–23, *Jan.* 1, 1944.—[See Abstr. 904 (1943)].

548.73 : 539.4.016.2 724

The width of X-ray diffraction lines from cold-worked tungsten and α-brass. SMITH, C. S., AND STICKLEY, E. E. *Phys. Rev.*, 64, *pp.* 191–198, *Oct.* 1 *and* 15, 1943.—The X-ray line width from specimens of cold-worked α-brass and W was measured as a function of Bragg angle and of X-ray wavelength. The results agree with a micro-stress theory of broadening. In α-brass the line width depends on crystallographic direction in a systematic manner while with W it does not.

548.73 : 621.386.1 725

X-rays in industry. *Elect. Rev., Lond.*, 133, *pp.* 685–686, *Nov.* 19, 1943.—[Abstr. 580 B (1944)].

548.74 = 3 726

On the occurrence of blackening lines in electron-microscope images of crystalline lamellae. ARDENNE, M. v. *Z. Phys.*, 116, 11–12, *pp.* 736–738, 1940.—Characteristic blackening lines are found to occur in electron-microscope images of crystalline lamellae which have no connection with the mass-thickness structure. H. G. S.

548.74 = 3 727

Electron-microscopical observations on zinc-black. GUNDERMANN, J., AND KÜLZ, H. *Kolloid Z.*, 98, *pp.* 287–289, *March*, 1942.—Metal-black obtained by evaporating metal under low pressure forms a precipitate of grey to black colour. Zinc-black thus prepared was observed under a stereoscopic electron microscope. Irradiation with electrons causes the metal of the particles to evaporate while its cover of ZnO remains as a pellicle of a thickness of 2–3 molecule layers. Thus the crystals at first totally opaque become increasingly transparent. The observations were made with an enlargement of 12 000 : 1. R. N.

548.74 = 3 728

Calculation of very small crystals from Debye–Scherrer diagrams by the gas interference method. BOERSCH, H. *Z. Phys.*, 119, 3–4, *pp.* 154–163, 1942.—The method of Debye and Ehrenfest is used. New max. are found in the neighbourhood of the primary ray. Their suitability for determining the dimensions of minute crystals (composed of a few elementary cells) is discussed. The intensity distribution in the Debye–Scherrer diagram of the primitive and inner-centred lattice for certain crystal forms is represented by a Fourier series. H. G. S.

548.74 : 537.533.73 = 3 *see Abstr.* 639

550.35 : 519.281.2 729

Least-squares determination of the velocity function $V = V_0 + kz$ for any set of time/depth data. LEGGE,

J. A., Jr., and Rupnik, J. J. *Geophysics*, 8, *pp.* 356–361, *Oct.*, 1943.—A method is presented by means of which a least-square fit of the circular ray path plotting function to time/depth data is obtained. An example is worked out illustrating the application of the method to an actual case.

550.38 730

Summary of the year's work, to June 30, 1943, Department of Terrestrial Magnetism, Carnegie Institution of Washington. Fleming, J. A. *Terr. Magn. Atmos. Elect.*, 47, *pp.* 207–213, *Dec.*, 1943.

550.38 : 621.396.11 731

The effect of the earth's magnetic field on the ionosphere. Howe, G. W. O. *Wireless Engr*, 21, *pp.* 1–3, *Jan.*, 1944.—[Abstr. 588 B (1944)].

550.381 732

List of geomagnetic observatories and thesaurus of values. III. Fleming, J. A., and Scott, W. E. *Terr. Magn. Atmos. Elect.*, 48, *pp.* 237–242, *Dec.*, 1943.—[See Abstr. 2630 (1943)].

550.385 733

Principal magnetic storms. July to September, 1943. *Terr. Magn. Atmos. Elect.*, 48, *pp.* 247–250, *Dec.*, 1943.

550.389 734

Mean *K*-indices from twenty-one magnetic observatories and five quiet and five disturbed days for 1942. Johnston, H. F. *Terr. Magn. Atmos. Elect.*, 48, *pp.* 219–227, *Dec.*, 1943.

550.389 735

American magnetic character-figure, C_A, three-hour-range indices, *K*, and mean *K*-indices, K_A, for July to September, 1943. Johnston, H. F. *Terr. Magn. Atmos. Elect.*, 48, *pp.* 228–231, *Dec.*, 1943.

550.83 736

Geophysical exploration for stratigraphic oil traps. Adler, J. L. *Geophysics*, 8, *pp.* 337–347, *Oct.*, 1943.—Stratigraphic traps are defined and classified and the applicability of various geophysical methods for the discovery of each of the different types of traps is discussed.

550.83(777) 737

Geophysical history of the Iowa field, Calcasieu and Jefferson Davis parishes, Louisiana. Eby, J. B. *Geophysics*, 8, *pp.* 348–355, *Oct.*, 1943.—The discovery well of the Iowa field was drilled in 1931, and the field has produced 48 000 000 barrels of oil to date. The history of the early refraction-seismograph, gravity, and reflection-seismograph exploration of this important field is presented.

551.311.234 : 627.4 : 539.215.9 *see Abstr.* 674

551.508.11 : 537.591 : 621.396.91 738

The radio sonde. Pickering, W. H. *Proc. Inst. Radio Engrs, N.Y.*, 31, *pp.* 479–485, *Sept.*, 1943. *Rev. Sci. Instrum.*, 14, *pp.* 171–173, *June*, 1943.—[Abstr. 612 B (1944)].

551.513 739

On the trajectories of air crossing the Equator. Spar, J. *Bull. Amer. Met. Soc.*, 24, *pp.* 318–319, *Oct.*, 1943.—The potential-vorticity theorem is used under certain simplifying assumptions to derive the trajectory of air particles moving N. across the Equator. A. Hu.

551.515.3 740

Pressure changes and "tornadoes" (squalls) on the west coast of Africa. Regula, H. *Bull. Amer. Met. Soc.*, 24, *pp.* 311–317, *Oct.*, 1943.—From observations at sea-level stations along the W. African coast a relation is demonstrated betw. pressure changes and wind variations. Examination of ships' barograms during the passage of "tornado" squalls confirms the relation, and its use in forecasting thunderstorms is indicated. A. Hu.

551.521.64 741

Committee on co-ordination of cosmic-ray investigations. Fleming, J. A. *Terr. Magn. Atmos. Elect.*, 48, *pp.* 215–216, *Dec.*, 1943.

551.547 742

Computation of pressures at a constant isopotential level. Skolnik, E. *Bull. Amer. Met. Soc.*, 24, *pp.* 306–310, *Oct.*, 1943.—The author describes methods evolved at the U.S. Weather Bureau for aiding unskilled personnel in plotting pressure maps at the 3 dynamic-km. isopotential level from adiabatic charts. The errors involved are discussed. A. Hu.

551.555.1 743

On the variations of the boundaries of the trades. Regula, H. *Bull. Amer. Met. Soc.*, 24, *pp.* 279–281, *Sept.*, 1943.—Observations made from aircraft show that the tropical Atlantic is dominated by short-term non-periodic weather changes caused by latitude shifts of the trade-monsoon boundary amounting to several deg. in a few days. It is suggested that these shifts are often due to pressure waves originating in subtropical or higher latitudes. A. Hu.

551.555.8(662) 744

The sand storms of the French Sudan. Weisse. *Bull. Amer. Met. Soc.*, 24, *pp.* 275–278, *Sept.*, 1943.—The annual and diurnal distributions of sandstorms are correlated with the prevailing wind and its surface velocity. Successful forecasting of a sandstorm depends largely on upper-wind soundings a few hours before the onset. A. Hu.

551.576.2(74) 745

Cloudiness and sunshine in New England. Livernance, W. B., and Brooks, C. F. *Bull. Amer. Met. Soc.*, 24, *pp.* 263–274, *Sept.*, 1943.—A series of maps shows the variations in cloudiness in New England from season to season. The data cover the period 1935–39 and are derived from observations at 60 stations. A. Hu.

551.579 746

Tensiometers for following soil moisture conditions in the field. Bair, R. A. *Proc. Iowa Acad. Sci.*, 48, *p.* 191, 1941.—Fifty instruments were installed at various soil depths and distances from field-grown maize plants in order to follow daily moisture changes without disturbing the growing plants. Tensiometer readings were used to study the rate of root penetration, comparative moisture use at different depths, rate of rainfall infiltration in the soil, and to calculate the depth of the water table. The zone of active water absorption progressed downward 2 in. a day. Two rains of more than 1½ in. failed to penetrate to the 24 in. soil point.

551.585.7 : 621.3.015.5 = 3 747

Influence of atmospheric conditions on the insulation strength of high-voltage systems, particularly at very

high altitudes. JACOTTET, P. *Arch. Elektrotechn.*, 36, *pp.* 629–651, *Nov.* 30, 1942.—[Abstr. 484 B (1944)].

551.594.2 : 621.396.821 748

Atmospherics and meteorological conditions at Madras. LAKSHMANAN, T. K. *Sci. and Cult.*, 9, *pp.* 128–129, *Sept.*, 1943.

551.594.221 749

Field disturbances produced by lightning. MCCANN, G. D., AND MORGAN, D. E. *Trans. Amer. Inst. Elect. Engrs*, 62, *pp.* 345–357, *June*, 1943. *Suppl.*—A survey is given of the variation of the earth's electric field during disturbed weather conditions, and in particular due to lightning discharges. With certain assumptions of charge distribution along the channel of the leader stroke and the velocity of propagation of the return stroke, the magnitudes and wave shapes of the individual components of the resulting field changes are determined as a function of the stroke distance, and the effects of varying parameters are investigated. The variation of field changes obtained theoretically is compared with published field observations. The field changes produced by cloud-cloud strokes are discussed. R. H. G.

551.594.221 = 3 750

Field fluctuations of cloud-to-earth and cloud-to-cloud lightning strokes. WICHMANN, H. *Gerlands Beitr. z. Geophys.*, 59, 3–4, *pp.* 299–305, 1943. *Abstr. in English in Wireless Engr*, 20, *p.* 607, *Dec.*, 1943.—Cloud-to-cloud strokes show slower and longer-lasting field fluctuations than strokes to earth. The rapid fluctuations ($< 0{\cdot}01$ sec.) occurring with strokes to earth are absent with cloud-to-cloud lightning or may appear weakly towards the end. E. R. A.

551.594.221 = 3 751

Report on the work carried out in 1941 at the Absroth lightning-research field. FRITSCH, V. *Gerlands Beitr. z. Geophys.*, 59, 3–4, *pp.* 306–330, 1943. *Abstr. in English in Wireless Engr*, 20, *p.* 608, *Dec.*, 1943.—Damage caused by obsolete lightning conductors, local statistics, measuring methods and apparatus for earthing resistances, are dealt with. E. R. A.

551.594.5 752

Remarkable auroral forms, Meanook Observatory, polar year, 1932–33. VESTINE, E. H. *Terr. Magn. Atmos. Elect.*, 48, *pp.* 233–236, *Dec.*, 1943.

551.594.51 : 525.75 753

Excitation processes in the night sky and the aurora. WU TA-YOU. *Proc. Indian Acad. Sci. A*, 18, *pp.* 40–66, *July*, 1943.—The emission spectra of the night sky and aurora, and especially the intensity distributions and diurnal variations, are explained on the view that all the excitation and quenching processes in the upper atmosphere are collisions of the second kind between metastable atoms and molecules of N_2 and O_2. Photo-dissociation of molecules during the day forms normal atoms which recombine to form metastable molecules whose collisions produce the metastable atoms. The max. energy available in these latter is only 6·1 eV, so that the atomic lines of N, O, H and the rare gases are not excited. A. HU.

553.676 : 621.315.613.2 754

Asbestos and asbestos products. *S. Afr. Min. Engng J.*, 54, *pp.* 293–297, *June* 5, 1943.—[Abstr. 507 B (1944)].

553.677 : 621.315.613.1 755

Strategic mica. *S. Afr. Min. Engng J.*, 54, *pp.* 335–337, *June* 19, 1943.—[Abstr. 506 B (1944)].

553.98 : 539.217 756

Interpretation of core analysis data. SCHMIDT, K. H. *Min. Mag.*, 33, *pp.* 649–655, *Dec.*, 1943.—In the petroleum industry, core analysis refers to the determination of the physical properties and fluid content of a sample. Measurements are made of fluid content, permeability, porosity, salinity, and of the amount of acid-soluble material. In measuring the fluid content, allowance must be made for the amount of water introduced into the sample by the boring equipment. With the aid of measurements of permeability and residual oil contents, it is possible to predict the rate of fluid production at the zone from which the sample was extracted. If the formation pressure be assumed to be due to hydrostatic head, measurements of the reservoir capacity can be made in terms of the porosity and water content in the case of a gas reservoir. Similar calculations are possible for oil reservoirs. Knowledge of the pore volume of the reservoir, and the permeability, are of value since these factors govern the required amounts of gas or water and the rate at which they may be forced into the formation to affect an artificial expulsive force. A. C. W.

578 : 778 757

Biological photomacrography and photomicrography with Kodachrome film. FOX, J. T. *Trans. N.Y. Acad. Sci.*, 6, *pp.* 30–41, *Dec.*, 1943.—A survey article, covering equipment and technique, dealing with the application of colour photography to biological problems. A. H.

581.037 : 582.271.2 : 53.047 758

Increased irritability in *Nitella* due to guanidine. OSTERHOUT, W. J. W. *J. Gen. Physiol.*, 22, *pp.* 65–73, 1942. *Abstr. in Biol. Abstr.*, 17, *Abstr.* 8193, *March*, 1943.—Guanidine applied to *Nitella* may lower the threshold of e.m.f. required to produce electrical stimulation and may give rise to trains of active currents; this effect is similar to that observed in animals. Rapid action currents are produced as well as square-topped action curves and transitional forms. These effects may be due in part to increased protoplasmic conductivity produced by penetration of guanidine. C. J. G.

582.272.2 : 53.047 : 581.037 *see Abstr.* 758

591.175 : 539.501 759

Visco-elastic properties and contraction of unstriated muscle. SINGH, I. *Proc. Indian Acad. Sci. B*, 18, *pp.* 53–57, *Sept.*, 1943.—The similarity of the effects of ions on the protoplasmic viscosity of simple organisms and that on unstriated muscle suggest that the latter consists of a viscous protoplasmic non-contractile element. The similarity of the reactions of isolated myosin strips and isolated muscle suggests that it contains a contractile element. This view is supported by the differential action of drugs, and viscous elastic properties of plain muscle.

591.175.6 : 537.311.3 760

The electrical resistance of unstriated muscle and other tissues and its relation to permeability and excitability. SINGH, I., AND SINGH, I. *Proc. Indian Acad. Sci. B*, 18, *pp.* 58–71, *Sept.*, 1943.—The

smooth muscle of the frog stomach and those of the abdominal wall of the frog *Rana Tigrina* were used. The apparatus consisted of an audio-oscillator, headphones and a Wheatstone bridge. The effect of temp. and of radiation, and of various narcotics and other chemicals were studied.

591.176 : 537.531 : 539.185.9 *see Abstr.* 671

614.715 : 535.33 *see Abstr.* 591

615.84 : 53 *see Abstr.* 557

615.84 : 539.16 *see Abstr.* 660

631.4 : 541.18 *see Abstr.* 701

632.94 : 539.217.3 : 532.72 *see Abstr.* 577

632.94 : 539.217.3 : 539.215 *see Abstr.* 672

661.713 : 679.5 : 539.378.6 *see Abstr.* 684

665.45 : 539.533 *see Abstr.* 688

666 : 536.421.4 : 539.377 *see Abstr.* 683

669.14 : 541.123.3 761

Representation of equilibrium conditions for the carbon-monoxide–carbon-dioxide–steel system. WILHELM, H. A., AND GRAY, C. F. *Proc. Iowa Acad. Sci.*, 49, *pp.* 307–321, 1942.—Proper conditioning of atmospheres for carburizing, for heat treatment, and for other high-temp. metallurgical processes, depends in general on control of each system with regard to its equilibrium conditions. One such reaction is $CO + CO_2$ in contact with carbon steel at elevated temps. This reaction has been studied by numerous experimenters and, in the present paper, the equilibrium conditions are represented by diagrams which, usually, are for only one total pressure (1 atm.), and a series of such figures would be required to represent equilibrium conditions for a series of total pressures. A family of curves is given of $K' = P^2_{CO}/P_{CO_2}$ plotted against temp. for steels having various C contents. A. C. W.

669.14 : 620.17 : 539.4/.5 *see Abstr.* 685

669.3 : 621.325.5 : 535.33.03 *see Abstr.* 592

676 : 539.217 762

Paper oil permeability measuring instrument. LANE, W. H. *Paper Tr. J.*, 117, *TAPPI*, *pp.* 28–29, 1943. *Abstr. in J. Text. Inst.*, 34, *A*643, *Nov.*, 1943.—A description is given of an instrument based on the Darcy equation $U/t = \mu PA/\eta L$, where U = vol. of oil which flows through the sample in time t, P = pressure difference across the sample, L = thickness, η = viscosity of the oil, μ = permeability of the sample. E. R. A.

676 : 539.217 763

Paper: air and oil permeability. LANE, W. H. *Paper Tr. J.*, 117, *TAPPI*, *pp.* 30–32, 1943. *Abstr. in J. Text. Inst.*, 34, *A*643, *Nov.*, 1943.—The results of determinations of the air and oil permeabilities of various types of paper are tabulated and discussed. The oil permeability of many papers decreases as the oil flows through. Suggested explanations of this decrease are critically examined. The more permeable sheets show little of this effect. Air permeability is a const. The oil permeabilities of the papers studied were < their air permeabilities, the smallest ratio of air to oil permeability being 1·37. E. R. A.

676 : 539.217.5 *see Abstr.* 678

677 : 678 *see Abstr.* 764

677.31 : 539.216.1 *see Abstr.* 677

678 : 620.178.786 : 539.56 *see Abstr.* 689

678 : 677 764

Textile fabrics and rubber as associated materials for manufacture. BLOW, C. M., AND KNIGHT, W. *J. Text. Inst., Manchr*, 35, *pp. P*7–*P*18, *Jan.*, 1944.—After a brief reference to the physical and mechanical properties of natural and vulcanized rubber, rubber products modified by textiles and textiles modified by rubber are considered. The problems associated with the manufacture and life of rubber tyres, hose and belting are discussed, and mention is made of the superiority of rayon over cotton for heavy duty where temperatures up to 140°C. may occur. Various methods of impregnating and applying finishes to textiles with rubber are described. A major difficulty of bringing textile fibres and rubber into association is that the particles of both are negatively charged when in alkaline solution. Progress has been made in the case of wool in changing the polarity of one or the other by the use of cationic or anionic soaps. Other developments, such as the use of synthetic rubber which may be formed inside the fibre, and the possible discovery of a non-oxidizable synthetic rubber, are mentioned. A. M. T.

679.5 : 661.713 : 539.378.6 = 3 *see Abstr.* 684

679.56 : 539.41 = 3 765

Synthetic resins: mechanical behaviour at low temperatures. RÖHRS, W., AND HAUCK, K. H. *Kunststoff-Techn. u. Kunststoff-Anwend.*, 11, *pp.* 213–228, 1941. *English Abstr. in J. Text. Inst.*, 34, *A*603, *Oct.*, 1943.—Investigations are described of the mod. of elasticity and the elastic limit of hardenable and non-hardenable synthetic resins at 320° to − 70°C. Expansion and compression measurements and polystyrene viscosity measurements were made. E. R. A.

77.012 : 541.18 = 3 *see Abstr.* 702

771.36 : 621.317.39 : 522.61 *see Abstr.* 524

771.54 : 778.1 *see Abstr.* 766

778 : 578 *see Abstr.* 757

778.1 : 771.54 766

Sensitometry of drawing-office photo-printing processes. HEYWOOD, H. *Engineering*, 157, *pp.* 21–24, *Jan.* 14, 1944.—Sensitivity measurements of the various available photo-printing papers are given in the hope that they may give operatives a more complete understanding of the processes involved. Both processes normally used (negative and positive) are considered. A. H.

778.3 : 621.386.83 : 539.26 *see Abstr.* 680

778.5 : 621.317.39 : 531.77 *see Abstr.* 571